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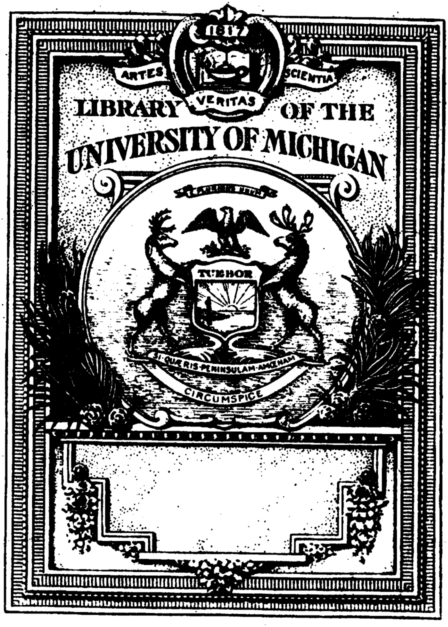
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GENIUS.

Genius, in antient superstition, a spirit who presided over the affairs of nations or individuals. It appears that, primitively, only one genius was spoken of, and this was called the Son of God, and to him was attributed the production of all things, and the administration of events: the genius, therefore, represented the creative power and the providence of the Deity. In time, each nation pretended to have a God or providence attentive to its peculiar prosperity, and hostile to the pretensions of others. Here we easily see one great opening to polytheism. Another was, that each individual begun to have his separate providence. It has ever been a prevailing idea with the professors of various religions, that the Deity transacts all the affairs of this world, and even created it, by commission; and the commissioners were genii.

Gentleman, in law, all above the rank of yeomen; in heraldry, those who were freemen, and therefore bore arms; in common speech, every well-bred man.

Genus, in natural history, a subdivision of any class or order of things, whether of the animal, vegetable, or mineral kingdoms. All the species of a genus agree in certain characteristics.

GEOCENTRIC *place* of a planet, is the place in which it appears to us from the earth, supposing the eye to be fixed there, or it is a point in the ecliptic to which a planet seen from the earth is referred.

GEOGRAPHY, the description of the surface of the earth, its natural divisions, and local characteristics. The fundamental principles of geography are the spherical figure of the earth, its rotation on its axis, its revolution round the sun, and the position of the axis or line round which it revolves, with regard to the celestial luminary; whence it follows that astronomy is the key of all geographical knowledge. See EARTH.

In general terms, the earth is termed a perfect sphere, in which case, the diameter from north to south would be precisely equal to the diameter from east to west; but it having been found that the latter exceeds the former by thirty-six miles, the shape of the earth is more truly denominated an oblate spheroid: by which is to be understood a globe, the upper and lower parts of which are flattened.

When any portions of the heavens are called the right or left, the expression is to be understood according to the profession of the person by whom it is used; because, according to that, his face is supposed to be turned toward a certain quarter. A geographer is conceived to stand with his face to the north, because the northern part of the earth is best known; an astronomer looks toward the south, to observe the celestial bodies as they approach the meridian; the antient augurs, in observing the flight of birds, looked toward the east; while the poets turned to the *Fortunate Isles*: in books of geography, therefore, by the right hand we must understand the east: in those of astronomy, the west; in such as relate to augury, the south; and, in the writings of the poets, the north.

Agreeably with these observations, the upper part of a map is the north; the lower, the south; the right-hand the east; and the left the west. See GLOBE.

GEOLOGY, has for its object the structure and formation of this globe: it, of course, embraces the consideration of the materials of which it is composed, and the circumstances peculiar to its original formation, as well as the different states under which it has existed, and the various changes which it has undergone.

GEOMETRY, the art of measuring quantity of every kind; whether length, breadth, heighth, or depth.

The parts of geometry are,

1. "Longimetry," or the art of measuring lines;

2. "Planimetry," or the art of measuring surfaces;

3. "Stereometry," or the art of measuring solids;

4. "Trigonometry," or the art of measuring not only surfaces, but heights and unknown distances.

The instruments used in geometry are the scale and the compass: the scale to draw and measure lines; the compass to describe circles, of which the use is the measurement of angles. The scale is usually divided into feet, inches, and lines; the circle is divided into 360 parts or degrees; and when an angle of 10, 20, or any other number of degrees are mentioned, 10, 20, or the specific number of parts of a circle divided into 360 degrees is intended.

The origin of this science is always attributed to Egypt, where it is said to have been produced by the necessity of ascertaining the boundaries of landed property, which are every year effaced by the inundations of the Nile.

From the time of Euclid, who died three hundred years before the Christian era, to that of Purback and Müller, who died in the fifteenth century, geometry was neglected. Since its revival, it has benefited by the illustrious labours of Neper, Descartes, Newton, and Leibnitz.

Geometry is of the utmost value as a branch of general knowledge, since it induces precision of thinking by admitting nothing but evident and indubitable demonstration. Geometry is distinguished into theoretical and practical. Theoretical or speculative geometry treats of the various properties and relations in magnitudes, demonstrating theorems: and practical geometry is that which applies those speculations to the uses of life in the solution of problems. The science of geometry depends wholly on definitions and axioms.

The definitions in geometry are clear, plain and universal, such as these: "A point has neither parts nor magnitude:" "A line is length without breadth or thickness." "A surface has length and breadth only." "A solid is any thing that has length, breadth and thickness." "An angle is the opening or inclination of two lines meeting in one point." "If one line standing on another makes the angles on both sides equal, those angles are right angles, and the line standing on the other is a perpendicular to that on which it stands." "A triangle is a plain figure, bounded by three lines or sides." "A circle is a plane figure, bounded by a curve line called the circumference, every part of which is equally distant from a point within called the centre."

An axiom is a manifest truth not requiring a demonstration: The following are examples of axioms, "Things equal to the same thing are equal to one another:" "The whole is greater than any of its parts, and equal to all its parts." "If equal things be taken from equal things the remainders will be equal." "Magnitudes which coincide with one another, or which exactly fill the same space, are equal to one another."

A proposition is something proposed either to be done or to be demonstrated, and is either a problem or a theorem.

A problem is something proposed to be done, of which the following are examples. Ex. 1. To divide a given line, as A B, into two equal parts: *Plate* GEOMETRY, Fig. 1.

From the points A and B as centres, and with any opening of the compasses greater than half the given line A B, describe the arcs cutting each other in *c c*, and draw the line *c c*: the point *x*, where the line *c c* cuts A B, is the middle point required.

Ex. 2. To raise a perpendicular to a given line C D, fig. 2, at A.

Take any two equal distances A *b*, A *d*, and from the points *b* and *d* with any opening of the compasses greater than *b* A, describe the arcs cutting each other in *c*, and draw the line A *c*, which is perpendicular to C D.

Ex. 3. To bisect the angle B, or to divide it into two equal angles. Fig. 3.

From the point B, with any radius, describe the arc A C, and from the points A and C with the same radius describe the arcs cutting one another at *b*, and draw *b* B, which will bisect the angle, A B C.

Ex. 4. To describe an equilateral triangle, A B C, that is, a triangle whose three sides are each equal to a given line. Fig. 4.

Let A B be the given line: from the points A and B, with an opening of the compasses equal to A B, describe the arcs, cutting each other in C, and from the point of intersection draw A C and C B, and the thing is done.

Ex. 5. To describe a triangle whose sides shall be equal to three given lines, fig. 5. Let the lines be A, B, C.

Take B as the base A B, then from A, with an opening of the compasses equal to C, and from B, with an opening of the compasses equal to A, describe the arcs cutting one another in C; draw the lines C A and C B, and the thing is done.

Ex. 6. Through a given point C to draw a line parallel to a given line, A D, Fig. 6.

Take any point *p*, in A D: upon *p* and C, with the distance *p* C, describe two arcs C *c* and *p q*, cutting the line A D in *p* and *c*. Make *p q* equal to C *c*, and through the points *q* and C draw a line which will be parallel to A D.

Ex. 7. To describe a square on a given line, A B. Fig. 7.

Raise a perpendicular at each end of the line A B equal to its length, and draw C D, and the thing is done.

Ex. 8. To find the centre C of any circle. Fig. 8.

Draw a chord, A B, at pleasure, bisect it in *d*, with the diameter D E, which diameter being bisected gives C as the centre.

A theorem is something proposed to be demonstrated.

A corollary is a consequent truth, deduced from some preceding truth or demonstration.

[We shall give an example or two of theorems.]

It is found by mathematical demonstration,

(1.) That one line standing upon another makes with it two angles, equal to two right angles.

(2.) That if one side of a triangle be produced, the external angle will be equal to both the internal and opposite angles.

(3.) That the three angles in every plain triangle are equal to two right angles.

These, with the method of bisecting an angle

[See Ex. 3.] may be considered as introductory to the famous theorem, commonly known as the "pons assinorum," or asses bridge, so denominated from its difficulty in the common Elements of Euclid: this is,

Theorem I. The angles of the base of an isosceles triangle, A B C, (that is, of a triangle whose two legs A B and B C are equal) are equal to each other. Fig. 9.

Demonstration. Bisect the angle A B C by the line B D, then the triangle A B D and B D C having the side A B = B C, B D common, and the angle A B D = C B D, will also have the angle A equal to the angle C. For if the triangle B C D were to turn on B D as on a hinge, it would be found that it exactly coincided with the triangle A B D in all its parts.

The corollaries to this theorem are: (1.) That the line which bisects the vertical angle of an isosceles triangle, bisects the base, and is perpendicular to it. (2.) That every equilateral triangle is likewise equiangular. (3.) If the sides of an isosceles triangle be produced to E and F, the angles under the base are equal, that is, E A D = F C D; because the line D A falling upon B E makes two angles,

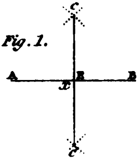
B A D + E A D = two right angles: for the same reason,

B C D + F C D = two right angles.

Taking away therefore B A D = B C D, and the remainders E A D and F C D are equal.

Theorem II. In any right angled triangle, A B C, the squares upon the sides A B and B C, fig. 10. taken together, are equal to the square on the hy-

Fig. 1.



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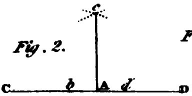

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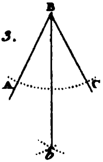

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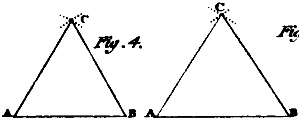

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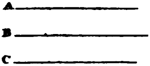

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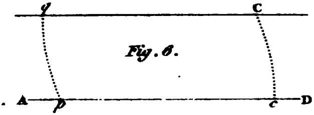

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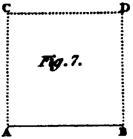

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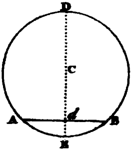


Fig. 9.

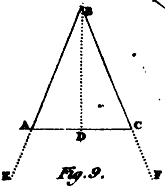
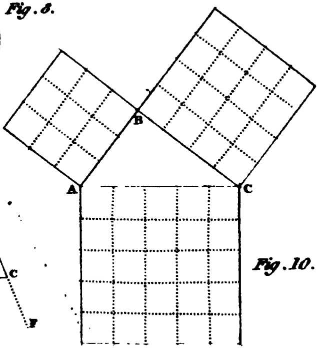


Fig. 10.



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pothenuse A C. This is called the Pythagorean theorem, because Pythagoras is said to have offered to the gods 100 oxen in sacrifice, in gratitude for the discovery.

The geometrical proof of this theorem is too difficult for a work of this kind, we shall therefore substitute an arithmetical solution: suppose the side A C $= 5$, B C $= 4$, A B $= 3$, then $5^2 = \overline{4^2 + 3^2}$, or $25 = 16 + 9$, and so it is shewn in the adjoining figure.

Corollary. Hence the square upon either of the sides A B, or B C, including the right angle, is equal to the difference of the squares of the hypothenuse and the other side: or equal to a rectangle contained under the sum and difference of the hypothenuse and the other side: thus

$$4^2 = 5^2 - 3^2 \text{ or } 16 = 25 - 9$$

$$4^2 = \overline{5 + 3} \times \overline{5 - 3} = 8 \times 2 = 16.$$

GEORGE *of Cappadocia*, or *St. George*, a saint or hero, whose name is famous throughout all the east, and by which several orders, both military and religious, have been distinguished. St. George is usually represented on horseback; his sanctity is established in the Latin as well as the Greek church; and England and Portugal have chosen him for their patron saint: yet who he was, or why he deserves these honours, is a profound mystery. Some deny his very existence, and reduce his effigy to a symbol of victory, while others have a faint glimpse of him in the person of an Arian bishop of Alexandria, who flourished between the reigns of Constantius and of Julian, and who was killed in a popular insurrection of the pagan inhabitants.

Giant's causeway, a magnificent production of nature, extending two miles in length along the coast of Antrim, in Ireland, and probably running under the sea as far as the coast of Scotland, since something of the same kind is met with there, and known by the name of Fingal's cave. It consists of many hundred thousands of columns of a black kind of rock, hard as marble, of about twenty feet in height, and a pentagonal, or five-sided figure. Each column stands by itself, not joining another in any part whatever; and yet so compactly are the whole arranged that scarcely a knife can be introduced between them. What still farther fills the spectator with an amazement that increases by length of examination, is the circumstance that though almost every pillar is pentagonal in its form, and therefore presents an apparently general likeness, no two in twenty thousand have their angles and sides equal among themselves or to each other.

The figure of these columns, as has just been said, is almost universally pentagonal: some few, however, are of three, four, six, and even eight sides; but these are so rare that they will seldom be discovered, except by the most scrutinizing eye. The construction of the pillars is equally curious. They are not composed of single stones, but of joints, united to each other, not with flat surfaces, but by articulations, in the manner of bones, the one length having a ball which is received into the socket of the other. This mode of union is only discoverable by forcing one of the stones out of its place; but the joinings, together with the multitude of columns, give to this stupendous production of nature somewhat of the effect of gothic architecture, or of so many trunks of palm-trees. The stone is a kind of basaltes, of a close grit, dusky hue, and uncommon gravity. It clinks like iron, melts in a forge, and is impenetrable by tools.

The scene is composed of various parts, thrown together with that irregularity which distinguishes and graces the works of nature, and almost constantly stamps them with a character not to be copied. The descriptions, therefore, that have been given by several travellers necessarily differ widely from each other, as being the result of observations on separate parts of a vast and broken assemblage of objects. The principal causeway runs out in one continued range of columns, and is from twenty to thirty, and for a few yards forty, feet in breadth. Its loftiest part, which has been stated at about twenty feet, is the narrowest, ten or fifteen feet being there its utmost breadth. The columns of this narrow part incline from a perpendicular, a little to the westward, and by the very unequal height of those on the two sides, form a slope on their tops, which affords a graduated ascent from the foot of the cliff to the summit of the whole. At the distance of six yards from the cliff, the structure recovers its perpendicularity, lowers its general height, spreads to a width varying between twenty and thirty feet, and extends, at all times of the tide, to the length of one hundred yards secure from the water, and supported on columns nearly of an equal height. As far as the high-water mark, this grand and extraordinary parade, though it has some inclination toward the water, may be walked on with safety; but beyond this, where it is worn with the surges of every tide, its declivity is so considerable, and its surface so uneven, that the foot is not to be trusted without the assistance of perpetual attention. At the distance of a hundred and fifty yards, it turns a little to the east, and running twenty or thirty yards in this direction, buries itself at length in the sea. At low-water, the whole visible extent of the causeway measures nearly two hundred yards: how much farther it continues is not certainly known; but from its declining appearance, it is thought to lose itself in the earth a little space beyond the spot at which it disappears. See PLATE.

GILDING, the art of covering a thing with gold, either in a foliated or liquid state. The beauty of gold has induced many attempts to imitate its appearance, and hence several methods of gilding have been invented. A coarse golden colour is sometimes given by painting, or by varnishing, without employing gold; but this is a false kind of gilding. In the manner alluded to, such a colour is given to brass and to silver, by applying upon these metals a gold-coloured varnish, which, being transparent, shows all the brilliancy of the metals beneath. Many ornaments of brass are varnished with this *gold-lacquering*, so called to distinguish them from those which are really gilt. Silver leaves thus varnished are put upon leather, which is then called *gilt-leather*. Among the false gildings, may also be reckoned that which is performed with thin leaves of copper or brass, called *Dutch-leaf*.

In the true gilding, gold is applied to the surface of the bodies. The gold intended for this purpose is beat into thin leaves, or otherwise divided into

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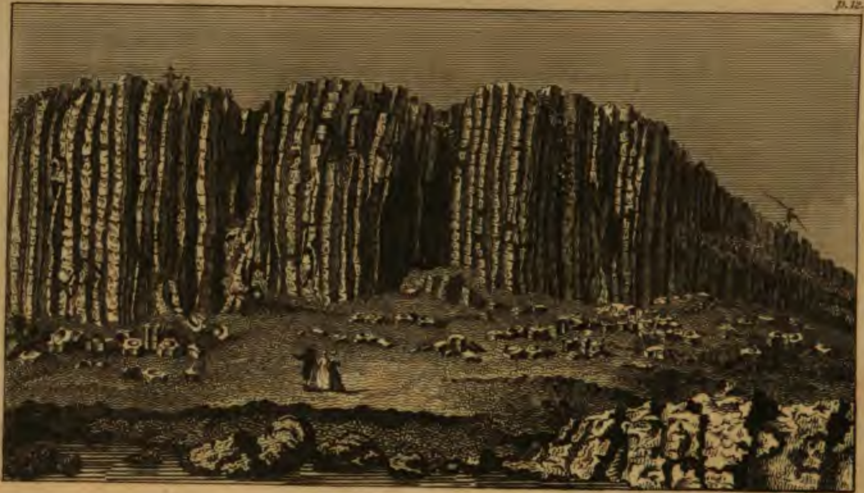


Cooper ſculp.

Giants Causeway.

very fine parts. When it is to be applied to a body that is of metal, the surface is previously covered with some gluey substance or size; and when the body is to be exposed to the injuries of the weather, a composition of drying oil and yellow ochre is used in place of the water-size.

In the process of gilding metals, the surface is first cleansed, and then the leaves applied, which, by means of rubbing with a polished blood-stone, and a certain degree of heat, are made to adhere in the manner desired. Gold is also sometimes fixed on metals, by previously reducing it into an amalgam or paste, with mercury. With this amalgam, the metal to be gilded is covered; and, on the application of heat sufficient to evaporate the mercury, nothing is left but the gold, which is afterward burnished with a blood-stone. Another method of gilding metal, is by the application of gold dissolved in aqua-regia.

Gold is also applied to glass, porcelain, and other vitrified substances, of which the surfaces, being very smooth, are capable of perfect contact with the gold-leaves. This gilding is so much the more excellent as the gold is more exactly applied, which done, the articles are exposed to a certain degree of heat, and afterward slightly burnished; or a more substantial gilding is fixed upon glass by the use of powder of gold mixed with a solution of gum-arabic, or with some essential oil, and a small quantity of borax.

GIN. See GENEVA.

GIN, in mechanics (a word contracted from *engine*), a machine for driving piles; or a trap.

GINGER, in botany, an aromatic root, cultivated at

Calicut and on the Caribbee Islands. The plant is a species of *amomum*, and resembles a rush. The knotty root spreads itself near the surface. While green, it is ate by the Indians as a sallad, or comfited with sugar and honey, after having been steeped in water for some time.

Glaciers, a name given to some extensive fields of ice among the Alps.

Glacis, in fortification, the glacis is that mass of earth which serves as a parapet to the covered-way, sloping easily toward the champaign or fields.

Gladiators, persons who fought for the amusement of the public in the amphitheatres in the city of Rome, and at other places under the dominion of the Romans.

Gland, in anatomy, a composition of various kinds of vessels, as the artery, vein, and nerve, and appearing to the eye a white, membraneous mass, the use of which, in the animal economy, is considered to be that of separating by filtration the vital fluids, and thus promoting their distribution according to their several ends. The latest authors upon this subject, which is one that has been variously explained, describe the glands as sieves, whose perforations being of different sizes, though of the same figure, only separate those particles whose diameters are smaller than their own.

Glass, a transparent brittle substance, considered as the form which bodies assume, when reduced by heat to the last state previous to evaporation. If exposed to excessive heat, glass will pass off in vapour. All solid bodies may be vitrified by fire.

The most perfect glasses are those produced by natural crystallization, and which are known by the name of precious stones. Artificial glass is one of the most beautiful and useful substances invented by man.

The materials of which glass is made are salt and sand, or stones. The salt is procured from potass brought from the Levant, and called *polverine*, or rochetta. These ashes are those of a species of aquatic-plant, called *kali*. Common kelp, barilla, and various other vegetables, also yield the salt required.

The sand or stone, which is called *tarso* by the manufacturers, is the ingredient which gives body and firmness. Flints are admirably adapted to the purpose, but the expense of preparation occasions them to be sparingly used; and, where proper stones cannot be conveniently had, a white, small, shining sand is employed.

Glass is said to receive its name from the plant *glastum*, or woad, which was called *vitreum* by the Romans, and which supplies a blue colour that, in some degree, is also observable in glass. Others are of opinion, that both *glass* and *glastum* are derived from the British word *glas*, signifying *blue*.

The method of manufacturing glass was discovered, according to Pliny, by accident. Certain merchants, he relates, were driven into the mouth of the Belus, a river in Syria, by stress of weather; and being obliged to continue there, and dress their victuals near the shore, where they used kali for fuel, the ashes of the herb mixed with the sand or stones, and produced glass: a phenomenon which, being known, induced the people of Sidon to pursue the hint it afforded: and, eventually, to establish the manufacture in question among the number of human arts. The production of the substance of glass is simply that of melting *silica* and vegetable salt together.

In making white and crystal glass, 200lb. of the whitest tarso, pounded small, and searsed, or passed through a fine hair sieve, is mixed with 130lb. of the salt of polverine, or of pearl-ashes, and put into a furnace distinguished by the name of *calcar*. After exposing this composition to a moderate heat during an hour, in which space the two materials incorporate, the fire is increased for five hours more. The matter, now called *frit*, being sufficiently calcined, is taken out, and kept in a dry place for three or four months. When the glass or crystal is to be made, a quantity of this crystal-frit, otherwise called *bollito*, with the addition of a due quantity of magnesia, or of manganese, is set in pots in the glass or working furnace; and when the substances are fluxed, the fluor is cast into pure water, to free it from the salt called *sandiver*, that would otherwise render it obscure and cloudy. When the crystal is, by a repetition of this operation, and a proper mixture of manganese, brought to a clear and shining substance, it is fit to be blown, or formed into vessels at pleasure.

In working or blowing round-glass, as phials and drinking vessels, the matter being sufficiently vitrified, in pots of tobacco-pipe clay, the workman dips his blowing-pipe into the melting-pot, and, by turning the pipe about, causes the metal to stick to it more firmly than even such a substance as turpentine. This he repeats four times, always rolling hot metal, thus attached to the end of his instrument, on a piece of plate-iron, over which is a vessel of water which helps to cool it, and, so, to consolidate and dispose it to bind more intimately with what is to be taken next out of the melting-pot. After dipping for the fourth time, the workman applies his mouth to the other end of his pipe, and blows gently till the metal swells into a bladder of about a foot in length. This bladder he rolls on marble to polish it; and, blowing a second time, forms it into a globe of about 18 or 20 inches diameter. Immediately after every time of blowing, he removes the pipe from his mouth, lest, by often blowing, he should draw the flame thither. The globe is now flattened by returning it to the fire, and then impressed with any form, by means of stamping-irons.

The feet or other appendages of vessels are made separately, and joined by the help of hot metal; and when the whole is thus far complete, the substance of the glass is brought to its true hardness by passing through the *lear*, or annealing-oven. See Annealing.

In blowing window or table-glass, the workman, while blowing, so manages the metal that it extends two or three feet in the form of a cylinder. This cylinder is put into the fire again, and blown a second time; and both these processes are repeated till it has extended to the dimensions required. When the cylinder is complete, it is heated on an earthern table, by which process, being previously cut, it is caused to open in length, and in the end falls like a sheet of paper, into the flat form requisite for use; and in which it is preserved by heating it again, cooling it on a table of copper, and hardening it, during twenty-four hours, in the annealing furnace, to which it is carried on forks; after which, it is ground and polished.

The best window, or crown glass, is made of 60lb. of white sand, 30lb. of purified pearl-ashes, 15lb. of salt-petre, 1 lb. of borax, and ½ lb of arsenic. Glass is coloured by the admixture of various metals.

Glazing, in the manufacture of pottery, the encrustation of vessels with a vitreous substance, the basis of which is lead. The usual composition is, 40 lb. of white sand, 20 lb. of red-lead, and 12 lb. of pearl-ashes. After these ingredients are ground together, they are calcined with a moderate heat; and, when cold, reduced to powder. When wanted, the powder is tempered with water, and laid on the ware by means of a brush. Placed in a furnace, the violent heat soon transforms this coating into a perfect glass.

Globe, in geometry, a round or spherical body, more usually called a *sphere*. Globe, in a particular sense, an artificial sphere of metal, plaster, paper, or other matter, on the convex surface of which is drawn a map, either of the earth or of the heavens, with the several circles conceived thereon for the assistance of science. Globes, as is here suggested, are of two kinds, terrestrial and celestial, each of considerable use, the one in geography, and the other in astronomy.

A map of the world, accurately delineated on a spherical ball, will truly represent its surface; for the highest hills are so inconsiderable with respect to the bulk of the whole body, that they take off no more from its roundness than do grains of sand from the roundness of a common globe. The diameter is nearly eight thousand miles, and the perpendicular height of no known hill is much more than three.

To the eye of an observer placed in any part of the indefinite space, where there is nothing to limit his view, all remote objects appear equally distant, and seem to be fixed in a vast concave sphere, of which it is itself the centre. The moon is much nearer than the sun to the inhabitants of the earth; some of the planets are at times nearer, and at other times farther from them than the sun; others never come so near as the sun always is; the remotest planet in this system is beyond comparison nearer than any of the fixed stars: yet all these celestial objects appear equally distant. If, therefore, we imagine a large hollow sphere of glass to have fixed to its inside as many bright studs as there are visible stars in the heaven, and these studs to be of different magnitudes, and placed at the same angular distances as the stars are placed, that sphere will be a true representation of the heaven, as it appears to an eye supposed to be in its centre, and viewing it all around; and if a small globe, with a map of the earth upon it, be placed on an axis in the centre of this starry sphere, and the sphere be made to turn round on this axis, it will represent the apparent motion of the heavens round the earth.

If a great circle be so drawn upon this sphere as to divide it into two equal parts, or hemispheres, and the plane of the circle be perpendicular to the axis of the sphere, this circle will represent the *equinoctial,* which divides the heavens into two equal parts, called the northern and the southern hemispheres; and every point of that circle will be equally distant from the poles, or ends of the axis in the sphere: that pole which is in the middle of the northern hemisphere will be called the north pole of the sphere; and that which is in the middle of the southern hemisphere the south pole.

If another grand circle be drawn upon the sphere in such a manner as to cut the equinoctial at an angle of 23½° in two opposite points, it will represent the *ecliptic*, or circle of the sun's apparent annual motion; one half of which is on the north side of the equinoctial, and the other half on the south. If a large stud be made to move eastward in this ecliptic, in such a manner as to go quite round it in the time that the sphere is turned round westward 366 times upon its axis, this stud will represent the *sun*, changing his place every 365th part of the ecliptic, and going round westward the same way as the stars do; but with a motion so much slower than the stars, that they will make 366 revolutions about the axis of the sphere in the time that the sun makes only 365. During one half of these revolutions, the sun will be on the north side of the equinoctial; during the other half on the south; and, at the end of each half, *in* the equinoctial.

If the terrestrial globe in this machine were about one inch in diameter, and the diameter of the starry sphere to be about five or six feet, a small insect on the globe would see only a very small part of the surface of that body, but it would command a view of one half of the starry sphere, while the convexity of the globe hid the other. If the sphere were turned westward toward the globe, and the insect could judge of the appearances which arose from that motion, it would see some stars rising to its view in the eastern side of the sphere, while others were setting on the western. Now, as all the stars are fixed to the sphere, the same stars would always rise in the same points of view on the east side, and set in the same points of view on the west side: but with the sun it would be otherwise, because that luminary is not fixed to any point of the sphere, but moves slowly an oblique circle within it; and should our insect look toward the south, and call that point of the globe, in which the equinoctial seems to cut it on the *left* side, the *east* point, and that in which it cuts the globe, on the right side, the west point; the little animal would see the sun rise north of the east, and set north of the west, for 182½ revolutions; after which, he would see it rise south of the east, and set south of the west, for as many more; and, in the whole 365 revolutions, the sun would rise in the east point, and set in the west, only twice. All would be the same, if the starry sphere stood still (the sun only moving in the ecliptic,) and the earthly globe were turned round the axis of the sphere eastward: for as the insect would be carried round with the globe, its motion would be imperceptible to his senses, and the sun and stars would appear to move westward. Such are the principles upon which astronomy teaches us to construct the globes, and that more comprehensive machine, the armillary sphere.

Glow-worm, see Lampyris.

Glue, among artificers, a viscid matter, which serves as a cement. The common or strong glue is made of the skins of animals, and the older the creature, the better is the glue made of its hide. Whole skins are very rarely used, though these are the best for the purpose. Parings, or scraps, and even the sinews of the feet, which last are the worst of materials, commonly supply their place. In making glue of parings, these are boiled to the consistence of a jelly, then strained by means of osier-baskets, poured into flat frames or moulds, cut into square pieces, and dried in the wind.

Gluten, a vegetable substance, found in great abundance in wheat, amounting to the twelfth part of the whole substance. It is obtained by kneading the flour into paste, which is to be washed very cautiously, by kneading it under a jet of water, till the water carries off nothing more, but runs off colourless, what remains is gluten: it is ductile and elastic. It has some resemblance to animal tendon or membrane, is very tenacious, and may be used as a cement for broken porcelain vessels. It is the gluten that renders wheat so useful in the art of bread-making.

Gnomes, spirits with which the imagination of certain philosophers has peopled the interior parts of the earth. See the poetical works of the late Dr. Darwin.

Gnomon, in dialling, the style, pin, or cock of a dial, which by its shadow shows the hour of the day. The word is Greek, and literally signifies something that makes a thing known: thus the style makes the hour known.

Gnostics, the name of a sect of Christians who were known in the east from the time of the first rise of Christianity. The first gnostics (or "knowing," or "enlightened" Christians) were Pythagorean or Platonic philosophers, who fancied they discovered deeper mysteries in the Scriptures than were perceived by those whom they considered as simple and ignorant. In process of time, the name designated sectarians of various descriptions, but who all agreed in certain opinions; and the tenet which seems most particularly to distinguish the gnostic name, was the existence of two first principles, or deities, the one the author of good, and the other of evil.

Jesus Christ they considered as the Son of God, and therefore inferior to the Father. He came into the world, they said, for the rescue and happiness of miserable mortals, oppressed with matter and evil beings. His manhood they denied, on the principle, that every thing corporeal is intrinsically evil.

Gobelins, or *Hotel-Royal de Gobelins*, a celebrated academy for tapestry-drawing, and manufactory of tapestry, erected in the suburb of St. Marcel, at Paris, by Lewis XIV. in the year 1666. The place was previously famous on account of the dyeing manufactory established there by Giles and John Gobelins, in the reign of Francis I. These eminent dyers discovered a method of producing a beautiful scarlet, which has ever since been known by their name; and so extensive has been their fame, that not only the colour, but the house in which their business was carried on, and the river they made use of, are called *Gobelins*.

God, the supreme being, the first cause, or creator of the Universe, and the only true object of religious worship. God, says sir Isaac Newton, is a relative term, and has respect to servants. It denotes an eternal, infinite, absolutely perfect being: but such a being without dominion would not be God. The word God frequently signifies lord, but every lord is not God. The dominion of a spiritual being, or lord, constitutes God; true dominion, true God. From such true dominion it follows that the true God is living, intelligent and powerful; and from his other perfections, that he is supreme, or supremely perfect. He is eternal, and infinite, omnipotent, and omniscient; that is, he endures from eternity to eternity, and is present from infinity to infinity. He governs all things that exist, and knows all things that are to be known. He is not eternity or infinity, but eternal and infinite. He is not duration and space, but he endures and is present; he endures always, and is present every where, and by existing always and every where, constitutes the very thing we call duration and space, eternity and infinity.

Gold, a metal which, when pure, is of a bright yellow colour; but if alloyed with other metals, of a white, more or less perfect, according to the alloy. It is the heaviest of all known bodies, platina only excepted; and remarkable for peculiar ductility and malleability. One grain of gold, it is said, may be so stretched out as to cover 98 Swedish ells, or 68.66 English yards of silver wire. Others make the calculation still more extraordinary. Sixteen ounces of gold are supposed to be sufficient to gild a silver wire equal in length to the whole circumference of the earth. With respect to its malleability, it is said that a book of twenty-five leaves of gold, contains little more than four grains of the metal.

Foliated gold, held between the eyes and the light, says sir Isaac Newton, looks of a greenish blue colour; and therefore massy gold lets into its body the blue rays to be refracted to and fro within it, till they be stopped and stifled; while it reflects the yellow outward, and therefore looks yellow.

Gold is found in solid masses in Hungary, Transylvania, and Peru; in grains, in the Spanish West-Indies; in a vegetable form, like the branches or twigs of plants; in a *drusic* figure, as if composed of groups or clusters of small particles united together, in Hungary; in plates or pellicles, covering over bodies, in Siberia; and, in a crystalline form, in Hungary. It is usually extracted from quartz and other species of stone, or from sand.

Gold exists in almost all parts of the world: the places that are celebrated for it are those in which it has been found in sufficient quantity to render the labour necessary, in collecting it, profitable.

The heat of the strongest furnace does not change the metallic properties of gold; but by a long continued application of the violent power of the sunbeams, collected in the focus of a burning-glass, and instantaneously by means of the electric fluid it may be calcined, and even reduced to glass.

GOLD-*leaf*, beaten gold, the thickness of which has been computed at $\frac{1}{382020}$ of an inch. The thickness, however, varies according to the purpose for which it is designed: that intended for gold-wire is much thicker than that for the frames of pictures. Gold is beaten on a block of marble, with hammers of polished iron. It is first reduced from the ingot to the thickness of paper; then cut into pieces of about an inch square; placed between skins; beaten thinner; and divided into squares, and again beaten.

GOLD-*thread* or *spun-gold*, flatted gold twisted over a thread of silk.

GOLD-*wire*, a cylindrical ingot of silver, superficially gilt, and afterward drawn through upwards of one hundred and forty holes of different bores (according to the process of wire-drawing) in order to bring it to the requisite fineness, which is sometimes equal to that of an hair. Before each time of drawing, it is covered with wax, to save the gold from being worn away.

GOLD-*wire flatted*, the wire already described flatted between rollers of polished steel, and used in spinning, weaving, lace-making, and embroidery.

GOLDEN-*number*, see CHRONOLOGY.

GOLF, a game among the Scots, commonly played on rugged ground, covered with short grass, in the neighbourhood of the sea-shore. A field of this sort is called, in Scotland, *links*. The game is generally played in parties of one or two on each side. Each party has an exceedingly hard ball, somewhat larger than a hen's egg: this is struck with a slender and elastic club, crooked in the head, and filled with lead. The ball will fly to the distance of two hundred yards, and the game is gained by the person who puts his ball into the hole with the fewest strokes.

GONDOLA ("a little ship"), a flat boat, very long and narrow, chiefly used on the canals at Venice. The medium dimensions of a gondola are upwards of thirty feet in length, and four broad. Each end terminates in a very sharp point, raised perpendicularly, to the height of five or six feet. Each gondola is managed by two gondoliers. Gondola is also the name of a passage-boat of six or eight oars, used on various parts of the coast of Italy.

GORDIUS, the hair-worm, a genus of the Vermes Intestina, of which there are five species. The Gordius aquaticus is from four to six inches long, is found in stagnant waters, and twists itself into various contortions and knots, and it is said that it will inflict a bite that occasions the whitlow.

GOSSAMER, is the name of a fine filmy substance, like cobweb, which is seen floating in the air in clear days in autumn, and is more observable in stubble fields, and upon furze and other low bushes. This is probably formed by the flying-spider, which, in traversing the air for food, shoots these threads from its arms, which are borne down by the dew.

GOSSIPIUM, Cotton, a genus of plants of which there are ten species; most of these are Asiatic plants, but some are of American growth and culture. These generally afford a woolly kind of substance which is applied to mechanical or domestic purposes, or woven into cloths. In the American islands the cotton shrubs grow without the smallest cultivation, but their produce is very inferior to that imported from the East. The cotton chiefly selected for propagation is Gossipium herbaceum, a native of the East-Indies. The pods of this plant from which the cotton is obtained are frequently as large as good sized apples. These are picked, and after the husks have been disengaged, the cotton is put to a small mill, to be freed from the seeds. The generality of cotton is white, but some of it is of a nankeen colour. The manufacture of cotton affords perpetual employment to many thousand of our countrymen.

Gothic Architecture, a style of building which stands opposed to the Greek and modern, and which obtained in England from the middle of the twelfth to the beginning of the sixteenth century.

The origin of this species of architecture is ably pointed out by sir James Hall, in the fourth volume of the "Edinburgh Transactions." He supposes a set of round posts driven firmly into the ground in two opposite rows, the intervals between the several posts being equal to that between the rows, and the height of each post being equal to three intervals. Long and flexible rods of willow being afterward applied to each post, let them be thrust into the ground at its base, and bound to it by two tyings, one near the ground, and another at two thirds of its height; and let the rods be left loose from this point upward, and free to be moved in any direction. Let three rods be connected with each outside corner-post, and five with each of the others; and let their position be such as may enable them to cover the main-post, so that when seen from between the rows, the lower part of each post shall be concealed from the view, and present the appearance of a bundle of rods.

Of the loose ends of the rods, the skeleton of a thatched roof may be readily formed. A rod from one of the posts being so bent as to meet a similar one from the post immediately opposite to it, in the middle of the space between them, and the two rods being made to cross each other, and bound together at their crossing, the complete figure of a gothic arch will be obtained. See Plate.

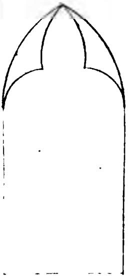


Fig. 3.

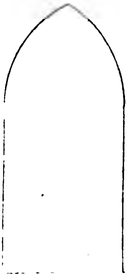
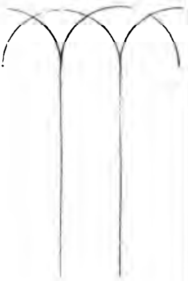


Fig. 2.

Fig. 1.



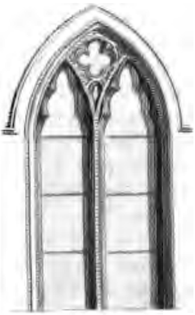


Fig. 4.

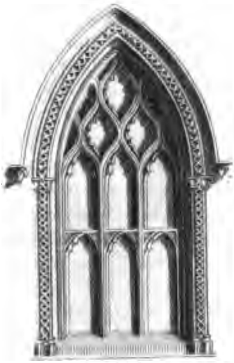


Fig. 5.

Cowper sculp

Figs. 1 & 2. shew how the pointed arch is formed.
Fig. 3. represents the leaves within the arch.
Figs. 4. & 5. trace the art with regard to the windows.
Published by J. Harris, S^{t} Pauls C^{h} Y^{d} 1811.

Gothic Architecture.

Fig. 6.

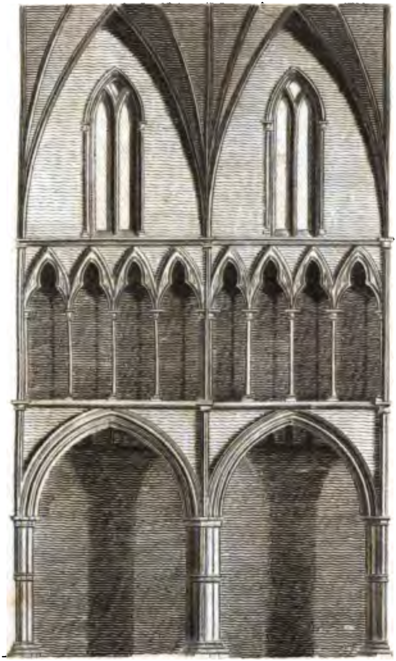


Fig. 6. represents the interior of a Gothic building, which generally consists of three ranges of arches: The lowest are bounded by a strong pillar, with others more slender filleted round it; from the capitals of these arise the first arch: the second range of arches open into a gallery, and the upper are windows.

Cooper sculp.

Published by J. Harris, St. Pauls Ch. Yd. 1811.

Government, in politics, the management of the concerns of a nation, with respect to its external security and internal order. Politics are to government, what theory is to practice. For the several forms of government, see Monarchy, &c.

Grace, in objects of taste, a certain species of beauty, which appears to consist in the union of elegance and dignity.

" Pertness," says Horace Walpole, " is the mistaken affectation of grace, as pedantry produces erroneous dignity: the familiarity of the one, and the clumsiness of the other, distort or pervert grace. Nature, that furnishes samples of all qualities, and in the scale of gradation exhibits all possible shades, affords us types that are more apposite than words: the eagle is sublime, the lion majestic, the swan *graceful*, the monkey pert, the bear ridiculously aukward.

" In general, I believe, what I call *grace*, is denominated elegance; but by grace I mean something higher, I will explain myself by instances: Apollo is graceful; Mercury is elegant."

Gracula, the grakle, a genus of birds of the order Picæ, of which there are thirteen species, of the Paradisæa tristis inhabits the Philippine these islands. It is exceedingly voracious, and has been known to swallow a young rat nearly two inches long, after beating it against the wires of its cage to soften it. These birds are remarkably fond of grasshoppers, and are said to have been imported into the isle of Bourbon to extirpate these insects, which they very effectually accomplished.

Graduate, a person who has taken a degree in a university. See Degree.

Graduation, of *mathematical instruments*, is the process by which the arcs of quadrants, theodolites, circular instruments, &c. are divided into degrees, minutes, &c.

Grafting, or engrafting, in horticulture or gardening, the taking a cyon or shoot from one tree and inserting it into another, in such a manner that both may unite closely and become one tree. The use of grafting is to propagate any curious sorts of fruits, so as to be certain of their kinds. All good fruits have been obtained accidentally from seeds; and of the seeds of these it is wholly uncertain whether they will produce fruit worthy of cultivation: but when shoots are taken from such trees as bear good fruit, no alteration need be apprehended, let the stock or tree on which it is grafted be of what kind it may.

The reason of the advantages obtained by grafting is differently explained; but it seems probable that they should be attributed to the greater facility with which the tender cyon can assimilate the juices already prepared by the stock, than those which it must draw immediately from the earth, if planted: as many young animals are provided with milk, which is a substance that bears to ordinary food, exactly the same relation that the sap of a tree does to the crude juices on which it feeds.

Grain, the name of a small weight, the twentieth part of a scruple in apothecaries weight, and the twenty-fourth part of a penny weight troy.

Grammar, the philosophy of language, as expressive of thought; or the rules of any particular language. Grammar of the first kind is sometimes called philosophical grammar: while the latter is distinguished by the name of the language of the rules of which it treats: as "English grammar" "Spanish grammar, &c." Grammar is the art of speaking and writing any language with propriety. General grammar teaches the principles which are common to all languages; and the grammar of any particular language teaches the principles peculiar to that language, according to the established usage and custom of it. Grammar treats of sentences, and of the several parts of which they are compounded. Sentences consist of words; words of one or more syllables; syllables of one or more letters; so that, in fact, letters, syllables, words and sentences make up the whole subject of grammar. By means of inarticulate sounds beasts can express certain feelings, but man is distinguished from the brute creation by the power of modifying a much greater variety of sounds, and of fixing to each modification a particular meaning. The sounds thus modified are called words, and as words have no natural relation to the ideas and perceptions of which they are significant, the use of them must either have been the result of human sagacity, or have been suggested to the first man by the Author of nature. Grammarians are much divided on this subject, but it does not come within our plan to enter into the argument. A sentence is defined to be an assemblage of words forming a complete sense, the principal parts of which are the subject, the attribute and the object. The *subject* is the thing spoken of it; the *attribute* is the thing or action affirmed or denied, and the *object* is the thing affected by such action. Thus if I say Charles loves Emma; *Charles* is the subject spoken of; *loves* the attribute or the action affirmed, and *Emma* the object, or person affected by the action. In every sentence there must be an object of which we affirm something: thus "Gold is heavy," here *Gold* is the object, *is* denotes existence, and the word *heavy* is the mode of existence. From the various modes used by different nations to express the property affirmed of any object, great disputes have arisen not only on the different sorts of words necessary to constitute a language, but on the sorts of words actually existing in a given language. The learned author of the Επεα Πτεροεντα maintains that two sorts of words only are necessary, viz. the noun and the verb; others lay down eight or even ten parts of speech. The theory on grammar, advanced by Mr. Tooke, in the work referred to, has been generally approved by the ablest grammarians; it has, however, been very rudely attacked in the article GRAMMAR, in Dr. Rees's New Cyclopedia, to which the reader is referred.

GRAMME, in French weights, answer to rather more than 15 grains, and the kilogramme is equal to a thousand grammes or 32⅛ troy-ounces.

GRANADIER, a soldier armed with a sword, a firelock, a bayonet, and a pouch full of hand-granadoes. Granadiers are distinguished by high caps; and they take the lead in attacks.

GRANADO, or GRANADE, in the art of war, a hollow ball or shell, of iron, or other metal, of about two inches and a half in diameter, which being filled with fine powder, is set on fire by means of a small fuse driven into the fuse-hole. Granadoes are thrown by the granadiers into those places where the men stand thick; particularly the trenches and other lodgments made by the enemy; and as soon as the composition within the fuse reaches the powder in the granado, the whole bursts, and wounds those by whom it is surrounded. These instruments were invented about the year 1594. The name is derived from the grains of the powder with which they are filled; or from a fanciful comparison with the pomegranate.

Grand-Jury. See Jury.

Granite, in natural history, a genus of stones, composed of separate and very large concretions rudely compacted together, of great hardness, giving fire with steel, not fermenting with acids, and slowly and imperfectly calcinable in a great fire. To this genus belong the common *moor-stone*, used for steps to buildings in London; the hard red granite of Egypt and Arabia; and the pale whitish granite with which the streets of the before-mentioned city are paved. Granite is also the name of a genus of stones of the order of petræ, of which the constituent parts are felt-spar, mica, and quartz; and which are found in Finland, Lapland, and Sweden.

Granulation, the process by which a metal is reduced into grains, this is effected by melting the metal, and then pouring it in a very thin stream into cold water. As soon as the metal comes in contact with water it divides into drops, which have a tendency to a spherical shape, and are more or less perfect, according to the thinness of the stream, the height from which it falls, and the temperature of the metal. Some of the more fusible metals may be reduced to much finer grains, by pouring it, in its melting state, into a wooden box, rubbed over with chalk, and shaking it violently before it has time to become solid.

Grass, in botany: the tribe of grasses is one of the families into which all vegetables are distributed by Linnæus. They are defined to be plants which have simple leaves, a jointed stem, a husky calyx named a glume, and a single seed. This description includes corn as well as the grasses.

Gratitude, a pleasant affection excited by a lively sense of benefits received or intended, or even by a desire of being beneficial. It is the powerful re-action of a well disposed mind, upon whom benevolence has conferred some important good. When the affection operates according to the natural course of influence, it will be correspondent to the importance of the good obtained, the distance in station between the recipient and his benefactor, the smallness of his claims, perhaps the consciousness of deserving very opposite treatment. These circumstances unite to warm the heart into raptures. The grateful mind is impatient of a silent and passive reception of the blessing. It cannot be restrained from acknowledging its obligations, either by expression or acts. It considers every return in its power as an act of the strictest justice; nor is it deterred by difficulties or dangers from making the attempt.

Gravitation, the tendency of bodies toward the centre of the earth, the phenomena of which have been attempted to be explained by the action of a very subtile etherial fluid: a theory to which sir Isaac Newton, in the latter part of his life, inclined.

GRAVITY, weight, or heaviness: that is, the *effect* of gravitation.

GRAVITY, *specific*, the weight specifically belonging to every different substance: thus if the weight of a cubic inch of distilled water, at a given temperature, be made the standard, the comparative weight of a cubic inch of gold is the *specific gravity* of that metal. We find in most books, treating on this subject, tables shewing the specific gravities of different bodies, compared with water, which is considered as 1; as a specimen the following short table is given

TABLE of SPECIFIC GRAVITIES of BODIES.

Water - - -	1.00	Iron (cast) - -	7.20
Antimony - -	4.06	—— (bar) - -	7.78
Arsenic - - -	3.59	Lead - - - -	11.35
Bismuth - - -	9.02	Mercury - - -	13.56
Brass - - - -	8.40	Platina - - -	19.50
Copper - - -	7.78	Silver - - - -	10.74
Gold (pure) - -	19.25	Shilling - - -	10.53
Guinea - - -	17.62	Tin - - - -	7.30
Portland stone -	2.49	Alcohol - - -	0.83

Now it is known that a cubical foot of water weighs exactly 1000 ounces, which is the case with pure water all over the world. Knowing this, we can, with the help of a table such as the foregoing, find the weight of any body whatever, thus a cubical foot of copper will weigh 7.78 × 1000 or 7780 ounces: of gold 19.25 × 1000 = 19.250 ounces, and so of the rest.

Suppose it be required to find the weight of a block of Portland stone that is five feet long, three feet wide, and two feet thick: find the solid contents by multiplying the three dimensions into one another, as 5 × 3 × 2 30: here the stone measures 30 cubical feet but one cubical foot by the table weighs 2490 ounces, therefore this block will weigh 2490 × 30 = 74700, equal to something more than two tons. See HYDROSTATICS.

GREEK-CHURCH, (also called the Eastern church, with reference to that of Rome), a Christian establishment, existing in Greece, several other parts of the Turkish dominions, and in Russia. This system agrees with the Roman in encouraging monachism; in praying to saints, whose pictures are preserved in its churches, as mediators; in the observation of fasts; and in the doctrine of transubstantiation. It disagrees with the Roman, in denying the supremacy of the pope; in admitting, under certain restrictions, the marriage of its priests; in the use of leavened bread at mass; in granting the cup to the laity, as well women and children as men; in omitting all procession, prostration, and adoration of the sacrament, when carried to the sick, and all feasts in honour thereof; in condemning the worship of images; in non-admission of the doctrine of purgatory: and in disbelief that the Holy-Ghost proceeds from the Son.

The head of the Greek-church is the patriarch of Constantinople, whose income is said to be one hundred and twenty thousand guilders. The other patriarchs are those of Jerusalem, Antioch, and Alexandria. All the principal dignitaries are chosen from among the monks: the secular clergy are subject to but few rules, and can never attain greater rank than that of high-priest.

GREEN, one of the original prismatic colours, exhibited by the refraction of the rays of light. The green colour of plants has been shown to depend upon the absorption of carbonic acid, and it is supposed that the leaves of plants have the power of decomposing the carbonic acid and water also; they emit the oxygen, while the carbon and hydrogen enter into the composition of the inflammable parts of the plant.

GREEN-CLOTH, in British polity, a board or court of justice held in the counting-house of the king's household, and composed of the lord-steward and inferior officers, who sit daily. To this court is committed the charge and supervision of the royal house-hold in matters of justice and government, with power to correct all offenders, and to maintain the peace of the verge. Without a warrant first obtained from this court, no servant of the household can be arrested for debt.—It takes its name from a green-cloth spread over the board at which it is held.

GREGORIAN YEAR, in chronology, a correction of the Julian year. In the latter, every secular or hundredth year is bissextile: in the former every one in four. This reformation, which was made by pope Gregory XIII. A. D. 1582, is also called the *New-style.*

GRE-HOUND, a species of dog used in pursuing the hare. The lightest coloured are said to be always the best.

GRENADIER, see *Granadier.*

GROTTO, a large deep cavern in a mountain or rock. Among the natural grottos of this country, are Okey-hole, Elden-hound, Peake's hole, and Pool's hole. Okey-hole, on the south side of Mendip-hills, is in the fall of those hills, which is beset about with rocks, and has near it a precipitate descent of near twelve fathoms deep, at the bottom of which there continually issues from the rocks a considerable current of water. This cavern is about 200 yards in length, and at the farthest part of it there is a good stream of water, large enough to drive a mill. At certain seasons there are in it multitudes of frogs and bats. Elden-hole is a huge profound perpendicular chasm, three miles from Buxton, ranked among the natural wonders of the Peak. Its depth is unknown. Peak's hole, and Pool's hole, are two remarkable horizontal cavities under mountains, the one near Castleton, the other just by Buxton. They seem to have had their origin from the springs, which have their current through them. The Grotto del Cani is a little cavern four leagues from Naples, the air contained in it is chiefly carbonic-acid-gas, which, by its weight, is found near the bottom of the cavern, so that a man may pass through it with safety, but to a dog, cat, &c. it will be fatal.

Gryllus, the locust, grasshopper and cricket, in natural history, a genus of insects belonging to the order hemiptera. There are sixty-one species, of which the most numerous is the gryllus migratorius, or common locust, which of all insects is most capable of injuring mankind. Legions of these animals are from time to time observed in various parts of the world, where the havoc they commit is almost incredible: whole provinces have been desolated by them in the space of a few days, and the air is darkened by their numbers; when they are dead, they are still terrible from the putrefaction arising from their vast numbers. This was the case in the year 852, when immense swarms took their flight from the eastern regions into the west: they destroyed in their course all vegetables, and the corn, at the rate of 140 acres per day; their daily marches or distances of flight were computed at 20 miles, and these were regulated by leaders or kings, who flew first and settled on the spot which was visited at the same hour the next day by the whole legion; these marches were always undertaken at sun-rise. The locusts were at length driven, by the force of the winds, into the German Ocean, and being thrown back by the tide and left on the shores, caused a dreadful pestilence by the stench which they made by their dead bodies.

Guards, in military economy, and in a particular sense, the troops that are designed to guard the king's person and palace; and which consist both of horse and foot.

Guards, *Yeomen of the*, a band of body-guards instituted by Henry VIII. in the year 1545. Their dress is similar to that of the time of their founder. One hundred are by rotation on duty, and there are seventy more, out of whom the place of any of the hundred who die is supplied.

Guard-*boat*, a boat appointed to row the rounds among the ships of war which are laid up in any harbour or river, to observe that their officers keep a good looking out, calling to the guard-boat as she passes, and not suffering her crew to come on board, without having previously communicated the watch word of the night.

Guard-*ship*, a vessel of war appointed to superintend the marine affairs of a harbour or river, to see that the ships not in commission have their proher watch-word kept duly, by sending her guard boats round them every night; and to receive seamen who are impressed in time of war.

Guidon, a sort of flag or standard, borne by the King's life-guard, and which is the flag or ensign of a troop of horse. It is broad next the staff, and pointed and divided at the opposite extremity.

Guild, a company, fraternity, or corporation, of which every member was to pay something toward the common charge.

Guillotine, an instrument of public execution, adopted in France during the period of the Revolution, as affording the least barbarous means of putting criminals to death. This name, as was reported at the time of its introduction there, was derived from that of the man who brought it forward. Under the denomination of the *maiden*, it was used in Scotland, before the union, when persons of rank were to be beheaded. It has also been employed, in at least one jurisdiction of England. At the first erection of the woollen manufactories in the neighbourhood of Halifax, the cloths were frequently stolen off the tenters in the night. In consequence a law was made, by which the magistrates of that town were empowered to pass sentence on, and execute all offenders, if they were taken in the fact, or owned it, or if the stolen cloth was found upon them; provided also the crime was committed, and the criminal was apprehended, within the forest of Hardwio. Those found guilty, were executed in the following manner: an axe was drawn by a pulley to the top of a wooden engine, and fastened by a pin, which being pulled out, the axe fell down in an instant, and did its work

If they had stolen an ox, horse, or any other beast, it was led with them to the scaffold, and there fastened by a cord to the pin that held up the axe; and when the signal was given by the jurors, who were the first burghers within the several towns of the forest, the beast was driven away, and the pin plucked out, upon which the axe fell and did its office.

Guittar, a musical instrument of the stringed kind, with double rows of strings, of which those that are brass are in the middle, except it be for the burden, are an octave lower than the fourth.

Gules, in heraldry, the red colour.

Gulf, or **Gulph**, in geography, a broad capacious bay, which, when very extensive, takes the name of a sea; as the gulph of Venice, also called the Adriatic sea.

Gum, a concrete vegetable juice, of no particular smell or taste, becoming vicious or tenacious when dissolved or moistened with water; totally dissoluble into a liquid by water; not dissolving in vinous spirits or oils; burning to a black coal, without melting or catching flame; and suffering no dissipation in the heat of boiling water. The pure gums are such as gum-arabic, tragacanth, senega, and the gum of cherry and plum-trees.

Gum-*arabic* is the produce of a species of *acacia*.

Gum-*resin*, see *Resin*.

Gun, in the military art, an instrument by means of which the explosion of gunpowder forcibly drives a ball or solid body to a considerable distance. Gun is an almost general name for fire-arms, including all kinds except the pistol and mortar. The gun is supposed to have been used in Asia at a very early date; but it was not invented in Europe before the fourteenth century. Roger Bacon, about the year 1280, suggested the possibility of applying the preparation since called gunpowder to the purposes of war; but the idea of blowing a body to a distance by its power was produced by its accidentally doing so, in the laboratory of Bartholomew Schwartz, a German monk. Guns were originally made of iron bars, soldered together, and strengthened with iron hoops; an example of which is still preserved in the Tower of London.

GUNNERY, the art of charging, directing and exploding fire-arms to the best advantage. It depends upon mathematical knowledge.

GUNPOWDER, a composition of saltpetre or nitre, sulphur, and charcoal, mixed together, and usually granulated. It is on this powder that every thing in the modern art of war depends. A white gunpowder has been talked of, the powder of which is described as equal to that of the black, while its explosion makes no noise; but no powder answering this description has ever been seen. It is supposed that its whiteness is produced by the mixture of touchwood or camphor, instead of coal.

GYMNOSOPHISTS, a sect of philosophers of India, of which the greater part were highly respectable men; but who were thus termed (naked philosophers) because the heat of the climate obliged them to wear as little clothing as possible. Their philosophy had a general resemblance to that which has always been received in India throughout. It should be observed, that the antients called him *naked* who was without his upper garment, or that loose robe or cloke over the tunic, which the Greeks denominated *imation*: thus, David is said to have danced *naked* before the ark, merely because he threw aside his cloke.

Gymnotus, a genus of fishes, including nine species, of which the most remarkable is the Gymnotus electricus, to which we have alluded in the article Electricity. This fish is found in the hot climates of Africa and America, particularly in the rivers of Surinam and Senegal. It has the power of giving an electrical shock to any person, or to any number of persons who join hands together. See Pl. Nat. Hist. fig. 21.

Gypsies, or **Egyptians**, an uncivilized nation of people, who are dispersed over Europe, Asia, and Africa. They made their first appearance in Germany, about the beginning of the sixteenth century. It appears that they are as much foreigners in Egypt as in any other part of the world. Their origin is wholly obscure. Some suppose them refugees from Hindostan. In countries where they are greatly discountenanced, they are extremely indolent, and consequently compelled to subsist dishonestly. In proportion as they are encouraged they are industrious. This is the case in Turkey. A liberal policy would probably destroy their corporate existence in all nations. At present, they are chiefly known in Europe as petty thieves, and pretenders to skill in that universal superstition, the prediction of things to come.

Gyrinus, the water-flea, a genus of insects of the order coleoptera: they are found on the surface of waters, on which they run with incredible velocity; when attempted to be taken, they plunge to the bottom, drawing after them a bubble very similar to a globule of quick-silver. The Gyrinus natator is the only Europæan species: this has a surface so bright as to shine like a mirror in the sun. The larva is of a very singular aspect, having a lengthened body furnished with many lateral appendages down the body. It is a highly curious object for the microscope. When its change arrives it forms for itself a small oval cell or case on a leaf of some water plant, and after casting its skin it becomes a chrysalis; these animals, like other beetles, fly only by night.

Gypsum, See Plaster *of Paris.*

H.

H, the eighth letter in the alphabet, is said by some grammarians to be only a hard breathing. H, used as a numeral, denotes 200, and with a dash over it $\bar{H}$, 200,000.

Habakkuk, one the twelve lesser prophets, whose prophecies are taken into the canon of the Old Testament. He is supposed to have prophesied before Zedekiah or about the time of Manasseh. His style is grand and beautiful.

Habeas-corpus, in law, a writ which is the glory of British jurisprudence, as the bulwark of personal freedom. In cases of private oppression, where one individual unlawfully confines another, this writ directed to such detainer, commands him to produce the body of the prisoner, with the date and cause of his caption and detention, to do, submit to, and receive, whatsoever the judge or court, awarding such writ, shall consider in that behalf.

This is a high prerogative-writ, and therefore by the common-law issuing out of the Court of King's-bench, not only in term-time, but also during the vacation, by a fiat from the chief-justice, or any other of the judges, and running into all parts of the king's dominions: for the king is at all times entitled to have an account why the liberty of any of his subjects is restrained, wherever that restraint may be inflicted.

By the action of this writ, of which are several kinds adapted to different occasions, relief from all unjust imprisonment may be obtained, causes removed from one court to another, for the promotion of justice, and prosecutors compelled to bring the prosecuted to open trial, instead of prolonging his imprisonment.

In cases of sedition, however, this prerogative of the crown may operate to the destruction of the constitution. The administrators of government may know, or (which is the same) think they know, that a man, who has yet committed no punishable offence, is actually labouring to subvert the fabric of the state. In such a case, there are but two modes of proceeding at their choice: they must either pretend ignorance of his machination, plot against his plot, and wait till the mischief be done; or, using their power, while they possess it, arrest the course of his treason, and obtain security, by confining him as long as it may be necessary so to do. That they who have the means of preventing it, should suffer an insurrection to break out, or an act of treason to be committed, will hardly be said to be consistent with their duty: it will be determined, therefore, that they ought to secure a dangerous individual. When secured, however, this individual has the privilege of compelling them either to prove his guilt, or to submit to his release; and thus sets their precautions at defiance.

It is to remedy this important inconvenience, that the guardians of the liberty of the realm occasionally consent to a temporary *suspension of the habeas-corpus*; the effect of which is, that, so long as it is permitted to last, a supposed offender may be confined without being brought to trial.

This is one feature of that peculiar character of the British constitution by which it is rendered capable of meeting all exigencies: a character which forms one of its principal merits. Unlimited power being lodged in the united will of the three estates, the government is capable of every possible variation, without any change in the establishment. In peaceable times a considerable degree of liberty may be left in the hands of the people, but in troublesome ones the executive power should have every possible strength; and, in conformity with these experimental truths, the British parliament may, in the hour of danger, by temporary suspension of every opposing statute, confide even absolute control in the hands of the administration, without permanently giving up one iota of freedom.

If, on such an occasion, the high authority in question were to repeal any statute by which liberty is preserved, or enact any new one by which it might be destroyed or endangered, the case, though not hopeless, would be infinitely more alarming; not *hopeless*, because the same authority that performed these acts, unless it gave away its own existence, would always be competent to rescind them; but *alarming*, because, though the concurrence of the *three* estates was necessary to the doing such act, the dissent of any *one* would be sufficient to prevent its being undone. In the case of *suspension*, the matter is widely different; for here the stretch of power dies away of itself, and can be kept in existence only by repeated renewal: the laws, like an elastic body, are bent only while the temporary pressure operates; and recover their upright position as soon as that loses its force.

Habendum, in a deed, that formal part of it which is to determine what estate or interest is granted by it, the certainty thereof for what time, and to what use.

Hackney-coaches, coaches which, in London and Dublin, are exposed in the streets to occasional hire, and which answer to the *fiacres* of Paris. They are so named from the first coaches and horses of the kind, which carried persons between London and the adjacent village of Hackney. They first began to ply in the streets, or rather to wait at inns, in 1625; and were then only twenty in number. In 1637, their number was restrained to fifty; in 1652, to two hundred; in 1654, to three hundred; in 1661, to four hundred; in 1694, to seven hundred; in the ninth of Ann, to eight hundred; in the eighth of his present Majesty, to one thousand, and they are now eleven hundred.

Haggai, the tenth of the minor prophets, who prophesied about 520 years before Christ. The occasion of his prophecy was the stop which was put to the building of the Temple, during many years after the foundation of it had been laid. The people had applied themselves to the building of their own houses, and neglected the house of God, till excited to the business by the earnest expostulations of the prophets, when they accomplished it in a few years.

Hail, in meteorology, a meteor consisting of vapour more intensely frozen than when it appears in the form of snow. Beccaria supposes it to be formed in the higher regions of the atmosphere, where the cold is extreme, and where the electric matter is very copious. In these circumstances, a great number of particles of water are brought near together, where they are frozen, and in their descent collect other particles, so that the density of the substance of the hail-stone grows less and less from the centre; this being formed first in the higher regions, and the surface being collected in the lower. Agreeably to this, it is observed that, on mountains, hail-stones, as well as drops of rain, are very small, there being but little space through which they can fall and increase their bulk. Drops of rain and of hail also agree in this, that the more intense the electricity, that forms them, the larger they are. Motion is known to promote freezing, and so the rapid motion of the electrical clouds may produce that effect. A more intense electricity also, he thinks, unites the particles of hail more closely, than the more moderate does those of snow. In a similar manner, we see thunder clouds more dense than those that merely bring rain; and the drops of rain are larger in proportion, though the height from which they fall is not so great. In general, the core of the hailstone is hard, and the outer part soft; as if the intense freezing region was in the highest regions, and particles less frozen had been attracted to it in the course of its descent: in particular instances, the fact is exactly the reverse.

Hair: the hairs of the human body are thin, elastic, dry filaments arising from the skin. They consist of the bulb situated under the skin, which is a nervous vescicle, and a trunk, which perforates the skin and cuticle, and is covered with a peculiar vagina or sheath. The colour of the hair depends on the medullary juice.

Halbert, in military economy, a weapon carried by the serjeants of foot and dragoons. It is a sort of spear; but besides the sharp point which is in a line with the shaft, there is a cross flat piece of steel, sometimes pointed at one end and broad at the other, sometimes forming a hook at one of its ends, and sometimes terminating in a knob at both. In its original construction, it is a union of the spear and the axe; and intended, like the modern pike, to answer the three purposes of thrusting, chopping, and hooking.

Halcyon-*days*, in antiquity, a title given to seven days before, and as many after the winter solstice; because the halcyon or King-fisher, at that calm season, built its nest in rocks close to the sea.

Half-moon, in fortification, an outwork composed of two faces, forming a salient angle, whose gorge is in the form of a crescent, or half-moon, whence the name.

Hall, *Westminster*, was anciently the residence of the English monarchs, who usually held their parliaments, and courts of judicature, in their dwelling-houses. A considerable part of this palace was burnt during the reign of Henry VIII. but what remains is still reserved for the courts of king's-bench, chancery, common-pleas, and exchequer. Adjoining apartments are allotted to the use of the Lords of parliament, and St. Stephen's chapel to that of the Commons. The great hall was built by William II. or Richard I. or II. It is three hundred feet long, and one hundred broad; and these dimensions are said to be greater, than those of any other room in Europe.

Halleluiah, a word signifying, Praise the Lord, to be met with either at the beginning or end of some psalms: such is psalm cxiv. and those that follow, to the end. Halleluiah was sung upon solemn days of rejoicing, Tobit, chap. xiii. v. 12. It was afterwards transferred from the synagogue to the church; and so much energy has been observed in this term, that the ancient church thought proper to preserve it, without translating it either into Greek or Latin, for fear of impairing the genius and softness of it. The fourth council of Toledo prohibited the use of it in times of Lent, or other days of fasting, and in the ceremonies of mourning.

Halo, in natural history, a coloured circle appearing round the body of the sun, moon, or any of the large stars.

Halymote, in the city of London, a court held before the lord-mayor and sheriffs for regulating the bakers. It was anciently held on the Sunday next before St. Thomas's day, and for this reason called the *halymota*, or *holy-court*.

Ham, in the geography of places named by the

Saxons, a place of dwelling, village, or town; whence Nottingham, &c. A field close to the house is also, in particular places, called a *ham*. Hamlet is a little dwelling-place.

Hanaper, or hamper; *Clerk of the*, sometimes styled *warden of the hanaper*, an officer in chancery, who receives all monies due to the crown, and has the custody of the charters, and other instruments upon which such monies accrue, which at present he deposits in bags, but formerly, it is supposed, in *hampers*, whence the name of the office.

Hand, in anatomy, an important member of the human body, which, from the facilities it affords in all operations, and accuracy in ascertaining the magnitude, &c. of extraneous objects, is justly considered as contributing very essentially to all that is either ingenious or scientific in the human character.

Hand, in speaking of horses, a measure of four inches; or that of a clenched fist.

Hanse, hans, or hanseatic towns, certain commercial cities which, at a very early period of European history, associated for the mutual protection of their commerce. In the year 1200, this league consisted of no less than seventy-two cities; particularly Bremen, Amsterdam, Antwerp, Rotterdam, Dort, Bruges, Ostend, Dunkirk, Middleburg, Calais, Rouen, Bourdeaux, St. Malo, Bayonne, Bilboa, Lisbon, Seville, Cadiz, Carthagena, Barcelona, Marseilles, Leghorn, Naples, Messina, London, Lubec, Rostoc, Stralsund, Stetin, Wiemar, Konigsburg, Dantzic, Elbing, and Marienburg. In the plenitude of their power, which lasted from the fourteenth to the sixteenth centuries, these cities awed the sovereigns of Europe. In the end, the latter threatened a strong confederacy against them, and compelled the cities under their jurisdiction to separate themselves; on which, the principal ones remaining, excluded many others, and found shelter under the protection of the German empire. They were now reduced to *four*, Lubec, Bremen, Hamburg, and Dantzic; and even this union has since been wholly dissolved. The word *hanse*, according to some, means alliance, or confederacy; and, in the opinion of others, on the sea-shore, or maritime.

Happiness, according to Dr. Paley, does not consist, (1), In the pleasures of sense: nor, (2), In an exemption from evils, which are without; nor, (3), In greatness or an elevated situation. It is to be estimated by the apparent happiness of mankind, which consists in the exercise of the social affections:—In the exercise of the faculties of the body or mind in some pursuit:—In a prudent constitution of habits, and in health of body and good spirits. Hence it appears that happiness is pretty equally distributed; and also that vice has no advantage over virtue with respect to this world's happiness.

Hare. See Lepus.

Harmonica, a musical instrument, in which the sound is produced from glasses. The method of extracting exquisite tones, by rubbing the finger on the brim of drinking-glasses, filled with water in different proportions, was an old discovery; but it remained for Dr. Franklin to construct the *harmo-*

sica, of which, among others, he describes the following particulars:

"The glasses are blown as nearly as possible in the form of hemispheres, having each an open neck or socket in the middle. The largest glass is nine inches in diameter, and the smallest three. Between these, there are twenty-three different sizes, differing from each other a quarter of an inch in diameter." The glasses being tuned, which is done by grinding them to the requisite thickness, a case is to be provided for them. This contains a spindle, upon which the glasses are vertically arranged, and which communicates by a string with the moveable step that gives it motion. The case stands on a neat frame with four legs.

"This instrument is played upon by sitting before the middle of the set of glasses, as before the keys of a harpsichord, turning them with the foot, and wetting them now and then, with a spunge and clean water. The fingers should be first a little soaked in water, and quite free from all greasiness; a little fine chalk upon them is sometimes useful, to make them touch the glass, and bring out the tone more readily. Both hands are used, by which means different parts are played together. Observe that the tones are best drawn out when the glasses turn *from* the ends of the fingers, not when they turn *to* them.

"The advantages of this instrument are, that its tones are incomparably sweet beyond any other; that they may be swelled and softened at pleasure, by stronger or weaker pressures of the finger, and continued to any length; and that the instrument, once well tuned, never again wants tuning."

Its disadvantages are the difficulty of adjusting the tones by grinding; the extreme skilfulness necessary in the player; and the impracticability of performing upon it many of the ordinary operations of the musical art.

Harmonical proportion, is that in which the first term is to the third, as the difference of the first and second, is to the difference of the second and third: thus 2, 3, 6 are in harmonical proportion, because 2 : 6 : : 1 : 3. In four terms the 1st is to the 4th as the difference of the 1st and 2nd is to the difference of the 3rd and 4th: that is 9, 12, 16, 24 are in harmonical proportion because 9 : 24 : : 3 : 8. "To find a harmonical mean proportion between two terms:" Divide double their product by their sum. "To find a 3rd term in harmonical proportion to two given terms:" Divide their product by the difference between double the 1st term and the 2nd term. "To find a 4th term in harmonical proportion to three terms given." Divide the product of the 1st and 3rd term by the difference between double of the 1st and the 2nd term.

Example 1. If a and b are the two terms: the harmonical mean is $\frac{2ab}{a+b}$.

2. The 3rd harmonical mean is $\frac{ab}{2a-b}$.

3. If a, b, c be the three terms, then the 4th harmonical mean is $2\frac{ac}{a-b}$.

Harp, a musical instrument of the stringed kind, and which, in various forms, appears to rank among the most antient inventions. The harp, peculiarly so called, was the instrument of the northern nations of Europe. The harps of Wales, and of Ireland, differ from each other. By the Welsh laws, a harp was one of the things that were necessary to characterize a freeman or gentleman, and none could pretend to this rank, who had not a harp, and was not able to play upon it. By the same laws, to prevent slaves from pretending to be gentlemen, it was expressly forbidden to teach, or to permit, them to play upon the harp; and none but the king, the king's musicians, and gentlemen, were allowed to have harps in their possession. The harp of Brian Boiromb, king of all Ireland, who was slain in 1014, after passing through many hands, has recently been deposited in the library of Trinity College. The workmanship bears evidence of an expert artist.

Harpies, in mythology, three rapacious and impure monsters of the bird kind, called Aello, Ocypete, and Celœno or Podarge. Vossius supposes them to be three winds; and Mr. Bryant, a college of priests in Bithynia.

Harpoon, or harping-iron, a spear or javelin, used to strike whales in the Greenland-fishery.

Harpoon *Gun*, a sort of fire-arm lately come into use, for discharging harpoons at whales in preference to the common method of the hand.

Harpsichord, a musical instrument of the string kind. It is played on by means of keys, the touching or striking of which moves a kind of little jacks, which also move a double row of chords, or strings of brass or iron, stretched over four bridges on the table of the instrument.

Hat, a covering for the head, in use among the men of the western parts of Europe, and said to have been first made about the year 1400; though, according to others, the Ecclesiastics of Brittany wore them in the twelfth century. When, in the fifteenth century, they became general among the laity, it was thought a great abuse that they should be adopted by the clergy; and several regulations were published, prohibiting the scandal.

HAT-*making*. The finest hats are made of the pure hair of the castor, or beaver. The skin of this animal is covered with two kinds of hair; the one long, stiff, and glossy, and the other short, thick, and soft. The latter alone is used in hat-making.

To tear off the one of these, and cut the other, women are employed, who, with knives adapted to each purpose, perform this part of the process.

To one third of dry castor, is added two thirds of old-coat, or hair which has been long worn by the North-Americans, from whom both articles are procured. The whole is then carded, in a manner somewhat finer than in the woollen manufactories; and, this done, a quantity sufficient for a hat is taken by weight. The stuff is now laid upon the *hurdle*, which is a square table, parallel to the horizon, having longitudinal chinks cut through it; and on this hurdle it is at once cleansed, mixed, and worked into a mass, by means of an instrument called a *bow*, and which much resembles in form the bow of a violin. In lieu of bow, some hatters employ a searse or sieve. The substance being thus formed, it is next hardened, and made into a kind of cap, at the *buson*, which is a sort of bench, with an iron-plate fitted thereon, with a little fire underneath, and filled with water. It is afterward placed on a mould, and dyed.

Hatching, the maturation of the eggs of birds, and production of the young ones alive. This is accomplished either by the natural warmth of the body of the parent bird, or by artificial heat. The art of hatching chickens, by means of ovens, has long been practised in Egypt; but it is there only known to the inhabitants of a single village, named Berme, and to those who live in its neighbourhood. Toward the beginning of autumn, these people scatter themselves over all the country; and each is ready to undertake the management of an oven. The ovens are of different sizes; being capable of containing from forty to eighty thousand eggs. The number of the ovens thus employed is computed at three hundred and eighty-six; and they are usually worked for six months in each year. A brood takes up in an oven, as under a hen, twenty-one days; so that it is easy for each oven to produce eight broods. On the calculation that two thirds of the eggs are hatched, thirty thousand chickens have been computed to be brought into life in each brood, of every oven; and the annual number of the whole, throughout the country, at least 92,640,000.

Hatchment, in heraldry, a popular name for atchievement. By these funeral escutcheons, it may be known after a person's decease what rank either he or she held when living, and if it be a gentleman's hatchment, whether he was a bachelor, married man, or widower, with the like distinctions for ladies. See Heraldry.

Hautboy, a musical instrument of the wind kind, resembling a flute in shape, only that it spreads and widens toward the bottom, and is blown into through a reed. The treble is two feet long; its tenor goes a fifth lower when blown open; and it has only eight holes; but the bass, which is five feet long, has eleven.

Hawker, antiently, a fraudulent person, who went from place to place, buying and selling old metals, and other goods, which ought to be sold in open market; at present, the term is used synonymously with *pedlar*, signifying one who travels about, selling wares. Every hawker must take out an annual licence, for which he pays £ 4; and if he uses one or more horses, or other beast or beasts of burden, he pays £ 8 additionally for each.

Hawking, a species of sportsmanship, formerly much practised in Europe; yet said to be now more followed in Tartary and Persia, than ever it was in this quarter of the world.

Head, in anatomy, the uppermost or foremost part of the body of an animal, and one of the principal seats of life.

Hearing, is a sensation by which we hear the sound of sonorous bodies. The curious structures of the labyrinth and cochlea of the ear tend to make the weakest sounds audible. When a person exercises great attention in hearing, the membrana tympani is stretched so as to render it more susceptible of sounds, and better prepared to catch even the most feeble vibrations of the air.

Heart, in anatomy, a musculous part of the animal body, situated in the thorax, on the anterior part of the diaphragm, wherein all the veins terminate, and from which all the arteries arise, and which, by its alternate contraction and dilatation, is the chief instrument of the circulation of the blood, and a principal seat of life.

HEAT is supposed to be a substance by the action of which fluids are evaporated, and solids are either dissipated in vapour, or rendered fluid, or converted into glass. The following observations may convey some idea of the nature and properties of this substance. An intimate connection subsists betwixt light and heat, though it has not been hitherto discovered on what this connection depends. Both are emitted from the sun with the same velocity nearly; both are refracted from transparent bodies, and refracted by polished surfaces; in both, the matter seems exceedingly rare, and consequently the addition, or abstraction of either, cannot sensibly affect the weight of bodies, into which they are introduced: their parts never cohere, but mutually repel each other, and when forcibly accumulated they fly off from one another in all directions. Heat, however, differs from light in this particular, viz. the latter produces in us the sensation of vision, whereas the former excites a sensation which we call by the name of the substance itself. Heat attracts other bodies, and is attracted by them. In consequence of this mutual attraction, it enters into other substances, combines with them, and occasions changes in them. For instance, it produces expansion in bodies, and increases their bulk. This property of bodies has furnished us with an instrument, called a THERMOMETER, (which see) for measuring their relative temperatures.

Heat gradually distributes itself in such a manner, that all contiguous bodies assume the same temperature. Thus, a bar of hot iron, exposed to the air, gradually cools, till it acquires the temperature of the bodies with which it is surrounded; and, on the other hand, a bar, cooled by ice, when taken into a warm room, becomes gradually hotter, till it attains the temperature of the room.

Heat penetrates all terrestrial bodies. In passing through air and several transparent substances, its motion is almost instantaneous; but through solid bodies, as iron or stone, it is remarkably slow. In the former case, heat is said to be transmitted, and in the latter to be conducted.

The greater number of solid bodies, when combined with heat, may be converted into fluids: and by the abstraction of heat the fluid again becomes a solid. Liquids, by the application of heat, may be converted into fluids, elastic fluids, invisible like air; thus, water by boiling, is converted into steam, which is water combined with a certain proportion of heat. In general, whenever a body changes its state, it either combines with heat, or separates from it.

Every body contains a certain quantity of heat, because no body is so cold that it cannot be made colder: but what quantity of heat exists in bodies has never been ascertained.

Heat may be evolved, and made sensible,—by combustion,—by percussion of hard bodies against each other,—by friction, or rubbing pieces of certain bodies, as dry wood, against one another. Light is also a source of heat, for, when coloured bodies are exposed to the light of the sun, their temperature is raised in proportion to the darkness of their colour; so that dark bodies must absorb and retain more heat, and reflect less of it, than those that are of a brighter colour.

The sensation of heat is produced by particles of heat passing into our bodies, and that of cold by heat passing out of them. We call any thing hot, when it communicates heat to bodies in its vicinity, and cold when it absorbs heat from them. The strength of the sensation depends on the rapidity with which the heat enters or leaves our bodies; and this rapidity is proportional to the difference between our bodies and the hot or cold substance, and to the conducting power of that substance.

Heaven, literally the sky; by metaphor, the abode of the Deity, and the seat of the souls of the just in the life to come. In these latter senses, it is sometimes called the empyrean, from the splendor by which it is characterized. It is also sometimes called the firmament. The word which, in the first chapter of Genesis, is translated *firmament*, was corrupted, it is said, by the LXX; and should be rendered *expanse* or *extension*. St. Paul speaks of the *third heaven*; and the orientals always describe seven heavens, or more. The highest is always supposed to be the dwelling of the Deity.

The foundation of the doctrine of several heavens was this: the antient astronomers assumed as many different heavens as they saw bodies in motion. These heavens were always solid, because the philosophers could not conceive that otherwise they could sustain those bodies; and spherical, as the most proper form for motion. Thus, there were seven heavens for the seven planets, and an eighth for the fixed stars. Ptolemy added a ninth, which he called the *primum-mobile*.

Alphonsus, the king, added two chrystalline heavens, to account for certain irregularities in the motion of the other heavens; and, lastly, an empyrean heaven was drawn over the whole, for the dwelling of the Deity, making the whole number twelve. Eudoxus supposed twenty-three, Calippus thirty, Regiomontanus thirty-three, Aristotle forty-seven, and Fracastor seventy.

Hebrews, a canonical book of the New Testament, written to the Jewish believers at Jerusalem and in Judea. It is generally believed that St. Paul was the author of this epistle, and that he wrote it soon after his imprisonment, or about the year 63. Its manifest design is to confirm the Jewish Christians in the faith and practice of the gospel of Christ, which they might be in danger of deserting through the ill-treatment of their persecutors: with this view the author obviates the objections of the Jews to the gospel of Christ, as inferior to their Mosaic dispensation, and at the same time pointing out its transcendant excellence over it in every particular.

Hegira, in chronology, the epoch from which the Mohammedans reckon their years. The word means flight, or voluntary exile, and alludes to the flight of Mohammed from Mecca. That lawgiver having preached the doctrine of the unity of God, became an object of persecution to the idolaters; and was compelled to fly from Mecca, on the evening of the 15th or 16th of July, A. D. 614, 622, or 630.

Heir, in law, one who succeeds to property or honours by inheritance.

Heir-*apparent*, a denomination given during the life-time of the ancestor to him, who, at the death of the former, will be his heir at law.

Heir-*presumptive*, one who, if the ancestor should die immediately, would, in the present circumstances of things, be his heir; but whose right of inheritance may be defeated by the contingency of some nearer heir being born.

Heir-*loom* (of *heir* and *loom*, a limb or member), in law, such goods and personal chattels as are not inventoried after the owner's decease, but necessarily come to the heir along with the house.

Helianthus, sun flower, a genus of plants containing more than twenty species, of which the most curious is the Helianthus gyrans, or moving plant, which is found in Bengal, and on the banks of the Ganges: it has a constant and voluntary motion, consisting in an alternate meeting and receding of the leaflets, a motion which does not seem to depend on any external stimulus, certainly not on the action of the sun, for they move in the dark as well as in the light, and even when the leaves are perfectly asleep. It is observable that the leaves, in the height of their erection, and during very warm weather, discover a tremulous motion.

Helm, an instrument suspended along the hind-part of a ship's stern-post, where it turns upon hinges to the right or left, serving to direct the course of a vessel, as the tail of a fish guides the body. The helm is composed of three parts, the rudder, the tiller, and the wheel; except in small ships, where the wheel is needless. The rudder descends into the water; the tiller is the tree, or beam, by which the rudder is moved; and the wheel conveys and increases the power of the hand in giving motion.

HELMET, in armoury, a covering for the head, antiently worn by the military. It secures both head and face, leaving an aperture only in the front, and this secured by bars.

HELMET, in heraldry, a representation of the antient helmet, placed beneath the crest, in imitation of the manner in which the crest was worn. An helmet of any kind is a badge of chivalry; and the peculiar kind of helmet, and the manner in which it is placed, denotes the specific rank of the bearer: thus, the helmet of an esquire (which is the lowest, for a yeoman has none) is close and in profile; that of a knight or baronet, open and full-faced; those of the higher ranks of nobility, are distinguished by the number of the bars on their vizors, and the view in which they are placed; and that of the king, by the greatest number of bars, and a full-faced position. At present, the helmet, like the title of esquire, is assumed at random. See HERALDRY.

HELMINTHOLOGY, the doctrine or natural study of worms, as ornithology is that of birds, and entomology that of insects. This science embraces the five following orders, viz. 1. Intestina, consisting of worms of the most simple formation, some of which live within other animals; some in the waters, and a few in the earth. The use of many of them is obvious to us: thus the gordius perforates clay to give a passage to springs and water; the lumbricus pierces the earth that it may be benefited by the action of the air and moisture: the teredo penetrates wood, to contribute towards its destruction, so that its elements may promote the growth of vegetables: the phloas and mytillus, in like manner, penetrate rocks to effect their dissolution. 2. Mollusca, naked worms, for the most part inhabitants of the sea, illuminating by their phosphoreous power the dark abyss of the waters. 3. Testacea, or molluscous worms with calcareous habitations, or shells which they carry about with them. 4. Zoophyta, composite animals, holding a medium between animals and vegetables. 5. Infusoria, which are extremely minute animalcules, generally invisible without the aid of glasses.

Helvetii, a people of Belgica, in the neighbourhood of the Allobroges, and the Provincia Romana, celebrated for their martial spirit. Their country was called Civitas Helvetia, and divided into four *pagi* or *cantons*. It lay to the south and west of the Rhine, by which it was divided from Germany; and extended toward Gaul, from which it was separated by mount Jura; and by the Rhodanus and Lacus Lemanus on the south. The neighbourhood of the Helvetii to the Gauls, occasioned them to be called a Gallic nation; and they were actually reckoned a part of the Celtic Gauls, till Augustus united their country with Belgica.

Hemi, a Greek word used in the composition of several terms borrowed from that language. It signifies the same with *semi*, *demi*, and *half*: thus, *hemiplegia* is a palsy of one half of the body; *hemistich*, *half* a verse; *hemicycle*, a *semi*-circle.

Hemisphere, in astronomy, one half of the sphere. The equator divides the sphere into two parts, called the *northern* and the *southern* hemispheres. The horizon also divides the sphere into two parts, called the upper and lower hemispheres. Hemisphere is also used for a map or projection of half the terrestrial globe, or half the celestial sphere, on a plane. *Hemispheres* are frequently called *planispheres*.

HEMP, or *cannabis*, a plant, of the diœcia class, well known for its use in the manufacture of cordage and cloths. The usual height of the plant is from five to six feet; but that which is cultivated near Brischwiller in Alsace, is sometimes more than twelve; its circumference three inches. It may be planted upon any land; the poorer producing that which is fine in quality, though small in quantity; and the richer and stronger, that which is abundant in the former, but coarse in the latter. Besides its uses in manufactures, hemp is said to recommend itself to the agriculturist, by driving away almost all the insects that feed upon other vegetables. Hence, in some parts of Europe, a belt of this plant is sown round gardens, or other spots, to preserve them. Hemp is known to be ripe, by the inclination of its stems to a yellow colour. This is about thirteen weeks after its sowing. After being pulled, and free from its leaves, seeds, and lateral branches, which is done by dressing with a ripple or wooden sword, it is made up into bundles to be steeped in water. The steeping, or *water-retting*, is to promote the separation of the bark, which is properly the *hemp*, from the reed, or ligneous part of the plant. The same end is sometimes attained by *dew-retting*, or exposing the stalks to the air; but the former method is generally thought preferable.

When the hemp is thoroughly retted, which is usually at the end of four, five, or six days, the operation of *reeding*, or completing the disengagement of the bark and woody part of the plant, commences. This is done in one of two ways; either dyeing and breaking the plant, or pulling out the reed from every stalk with the hand.

When reeded, the *hemp* must be cleansed of the glutinous matter with which it is its nature to abound. This is done by pouring water through it, and pressing out the water after affusion; care being taken not to let the threads twist or entangle each other, which they are apt to do. *Hemp* is broken by machinery; after which, it is beat. This labour was formerly performed entirely by hand; but, at present, a water-mill, which raises three heavy beaters that fall alternately, is almost universally used. While the mill is at work, a boy turns the hemp, that all parts of it may receive the strokes. The finer it is required to make the tow, the more beating is necessary.

The tow, being first dressed or combed, is sold to the spinners, who reel the yarn as follows:

2 yards make	1 thread	2 yards.
40 threads	1 lea	80
20 leas	1 skain	1600
3 skains	1 clue	4800

From the spinners it passes to the bleachers, who receive twenty or twenty-one clues for every one hundred and twenty bleached.

Only the coarser kinds of hemp are employed in making cordage; the finer being used for cloth, which though incapable of receiving the delicacy of linen, is incomparably stronger, equally susceptible of bleaching, and possessed of the property of improving its colour by wear. The English hemp is much superior in strength to that which grows in any other country. Next to this is the Russian, from which sacking is usually made, A large quantity of Russia-sheeting, coarser at the price than any other foreign cloth, is imported into England on account of its strength.

The great importance of *hemp* to the maritime interests of the United Kingdom, occasions it to form a considerable article of commerce. The cordage and sails of a first-rate ship of war are said to consume 180,000lb. of rough hemp. In the year 1788, the quantity imported into England was 58,464 tons: which at 20*l.* per ton, amounted to 1,269,280*l.* and which at an average product of one fifth of a ton per acre, required 292,320 acres for its growth: and to this prodigious import, which is chiefly obtained from Russia, is to be added the home-crop, raised in Sussex and Suffolk. In the year 1787, attempts were began to be made at increasing the cultivation at home, by giving a bounty of three-pence per stone, at the same time discouraging the use of foreign hemp, by the imposition of duties.

Hemp, *Chinese*, a species of hemp superior to the common; but which has not yet been cultivated in England otherwise than in the way of experiment.

Hepatic air, the old name of the "*sulphurated hydrogen gas*," which is obtained from the "*sulphuret of potass*," formerly called "*hepar sulphuris*," or "*liver of sulphur*." By impregnating water with this air, Bergman found a method of imitating the hot or sulphureous mineral waters.

Heptagon, in geometry, a figure consisting of seven sides, and as many angles.

Heptagonal numbers, are those in which the difference of the terms of the corresponding arithmetical progression is 5, as Arithmeticals, 1, 6, 11, 16, 21, 26, &c. Heptagonals 1, 7, 18, 34, 55, 81, &c. where the heptagonals are formed by adding continually the terms of the arithmeticals above them, whose common difference is 5. One property of these numbers is, that if any one of them be multiplied by 40, and to the product 9 be added, the sum will be a square number: thus $18 \times 40 + 9 = 729 = 27^2$. The series of the squares will be 1^2, 17^2, 27^2, 37^2, &c. the common difference of whose roots is 10.

Heptarchy, a government exercised by seven persons; or, a nation divided into seven governments.

Saxon heptarchy, the seven kingdoms existing in England, between the fifth and ninth centuries. These kingdoms were severally named,

1. Kent,
2. Sussex,
3. Wessex,
4. Essex,
5. Northumberland,
6. East-Angleland,
7. Mercia.

The heptarchy was formed by degrees; but it may be said to have commenced in A. D. 449, when Hengist arrived on the island. In A. D. 827 Egbert was enabled, by a combination of circumstances, to assume the title of king of England; but, in reality, three of the kingdoms, Northumberland, East Angleland, and Mercia, were still governed by their own kings, though those kings were his vassals and tributaries. The kingdoms he actually governed were Kent, Sussex, Wessex, and Essex.

Herald, the title of an officer, whose duty it antiently was, to denounce war, to challenge in battle and combat, to proclaim peace, and to execute martial messages; but who is, at present, to conduct royal processions and ceremonies, creations of nobility, and dubbings of knights; to publish declarations of war, not to the enemy, but at home; to proclaim peace; to record and blazon armorial bearings; and to regulate abuses in arms, under the authority of the earl-marshal, by whom he is created.

The heralds were formed into a college by Richard the Third.

Heraldry, the science of things pertaining to heralds; and more particularly of the laws of arms, or armorial bearings.

Arms, in a primitive point of view, are badges of distinction; in an historical one, badges of honour: every thing connected with them has sprung from custom; and it is only by observing the rules the same authority has established, that their value can be preserved. A display of these rules, then, is the subject of heraldry.

Arms may be considered under four heads; the escutcheon, the tinctures, the charges, and the ornaments.

I. The *escutcheon*, or *shield*, is the field or ground upon which the tinctures and charges are displayed. The shape of the escutcheon, though of much importance in the eye of a herald, is made to vary considerably, according to the caprice of the artist or the wearer. See Plate I. Heraldry.

II. The *tinctures*, or metals and colours, by which the field and charges are various distinguished, are technically denominated as follows:

Metals.

Gold	Or, *or*	Topaz, *or*	Sol
Silver	Argent	Pearl	Luna.

Colours.

Blue	Azure *or*	Sapphire, *or*	Jupiter.
Red	Gules	Ruby	Mars
Green	Vert	Emerald	Venus
Purple	Purpure	Amethyst	Mercury
Black	Sable	Diamond	Saturn
Orange	Tenné	Iacinth	Dragon's head
Blood-colour	Sanguine	Sardonix	Dragon's tail.

The names *or*, *argent*, &c. are used in describing the arms of commoners, and, on most occasions, for all others; but some employ *topaz*, *pearl*, &c. in speaking of the arms of nobles; and *sol*, *luna*, &c. for those of sovereign princes.

When natural bodies, as animals and vegetables, are borne in arms, they are frequently represented in their own colours; and, in these cases, they are described by the heralds as *proper*.

Tinctures are thus distinguished in engravings:

Or is expressed by dots: ....

Argent is plain.

Azure is expressed by horizontal lines: ═.

Gules by perpendicular: ‖.

Vert by diagonal lines, drawn from the dexter chief to the sinister base points: \\

Purpure by diagonal lines, from the sinister chief to the dexter base points: //

Sable by perpendicular and horizontal lines, crossing each other: +.

Tenné by diagonal lines, from the sinister chief to the dexter base points, traversed by horizontal lines: ⌿.

Sanguine, by lines crossing each other diagonally: ×.

Furs, as *ermine* and *vair*, frequently supply the place of colours.

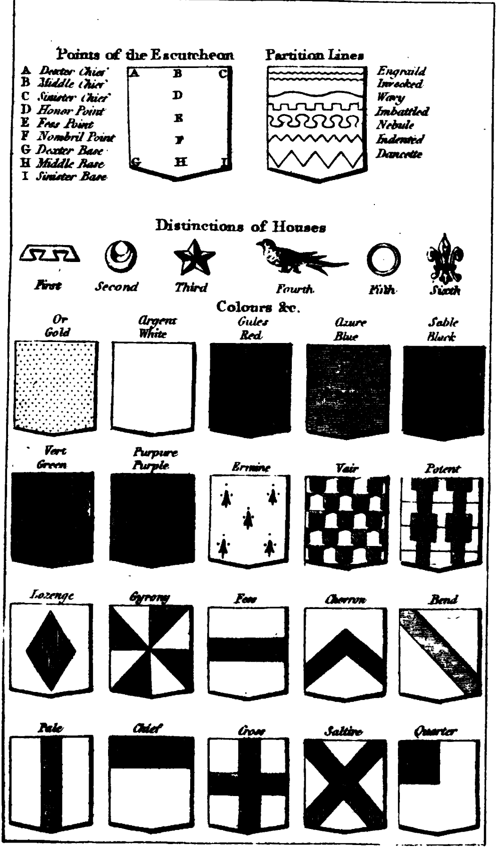
Escutcheons are frequently of more than one colour, and when this happens they are divided by lines drawn in various directions. When an escutcheon is *parted per pale*, a perpendicular line divides it into two equal parts | ; when *per fess*, a horizontal line — ; when *per bend*, dexter or sinister, by a diagonal line \, or / ; when *per cross*, by both a perpendicular line and an horizontal one ; and when *per cross saltier*, by two, both of which are diagonal: ×.

An escutcheon, divided *per cross*, or *per cross saltier*, is said to be quartered.

Heralds have contrived several marks, by which the bearers of the same coat of arms are distinguished, according to their nearness to the head of the family. To the eldest son, they have given the label; to the second, the crescent; to the third, the mullet; to the fourth, the martlet; to the fifth, the annulet; to the sixth, the fleur de lis; to the seventh, the rose; to the eighth, the cross-moline; to the ninth, the double quaterfoil. The children of these sons superadd the same differences; thus, the eldest son of the second son bears a label upon his father's crescent.

III. A *charge* is any thing contained in the field. All charges are comprehended under three denominations: *honourable ordinaries*, *sub-ordinaries*, and

Heraldry.



Cooper sculp.

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common charges.—The sub-ordinaries, and common charges, are so numerous, that to follow them is impossible; but of the honourable ordinaries a brief catalogue follows:

Honourable ordinaries:

1. Chief
2. Pale
3. Bend
4. Bend sinister
5. Fess
6. Quarter
7. Chevron
8. Cross
9. Saltier.

IV. Ornaments, or exterior decorations of escutcheons, are of ten principal kinds:

1. Crowns
2. Coronets
3. Mitres
4. Helmets
5. Mantlings
6. Chapeaux
7. Wreaths
8. Crests
9. Scrolls
10. Supporters.

1. *Crowns* are of two general kinds; as the *mural*, *naval*, and other crowns of merit, given as honourable augmentations; and kingly crowns, denoting the sovereign rank of the bearer.

The first crowns of kings were only diadems or fillets; but, among the moderns, the forms are varied and complex. The crown of the more recent kings of Great Britain, and which is distinguished by the name of *St. Edward's crown*, consists of a crimson cap, lined and faced with ermine, and surrounded by a circle of gold, which circle is enriched with precious stones, and heightened up, or adorned on its upper rim, with four croises-patee, and as many fleurs de lis,* alternately; and from which arise two arched diadems, beset with pearls, and intersecting each other in the centre, where they are surmounted by a mound, itself surmounted with a croise-patee. Plate II.

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* *Fleur de lis* probably means *fleur de Louis;* a conjecture which seems to be supported by the circumstance that, in England, it is frequently called *flower de luce*, which may be understood *flower de Lewis:* there is also a tradition respecting the assumption of this flower, by a king Lewis, which corroborates the etymology.

The *mound* here mentioned is a globe. The word is a corruption of *monde*, world; and the mound, with its cross, an emblem of Christendom, or the dominion of the cross: by which dominion was perhaps originally intended, the supremacy of the pope. The *place* of this emblem, which, on all the crowns of Europe, is above the ensigns of temporal government, is suspicious; but, though it might be assigned by the ambition of the church, it is as easy to ascribe it to the piety of the throne. The fleur de lis, or lily, doubtlessly took place of the strawberry-leaves, at the time that a claim on the kingdom of France was made.

The queen's crown, though smaller, resembles the king's.

The *coronet* of the prince of Wales resembles the king's crown, excepting that it has but one diadem. To this dignity there also belongs a badge, consisting of a plume of three ostrich feathers, set in the ancient coronet of the heir-apparent of England, with the motto, *Ich Dien*, written upon a scroll. The motto, which, in the Saxon language, signifies "I serve," was assumed by Edward, the first prince of Wales, commonly called the *Black-prince*, who, after the battle of Cressy, in which he had killed John, king of Bohemia, took from the head of that monarch the plume, the representation of which has been described, and placed it on his own.

The coronets of the immediate sons and brothers of the king have no diadem.

The coronets of the immediate daughters and sisters of the king differ from those of the princes, in having strawberry leaves between the crosses, instead of fleur de lis.

A *duke's* coronet is a circle of gold, enriched with precious stones and pearls, and set round with eight large strawberry-leaves.

A *duke's coronet* and a *ducal coronet* are very different things. The latter, which is borne by many commoners of no distinction, is a circle of gold, enriched with precious stones, but set round with only four strawberry-leaves.

A *marquis's* coronet is a circle of gold, enriched with precious stones and pearls, and set round with four strawberry-leaves, and as many pearls, raised on pyramidical points; an earl's, a circle of gold, enriched as before, from which issue eight points, or rays, upon the top of each of which is a large pearl; a viscount's, is a circle also enriched, round, and close to, the rim of which, are set an unlimited number of pearls; a baron's, a plain gold circle, set round with six pearls. See PLATE.

The gold and other jewel-work here described, are the essential parts of crowns and coronets; but it is usual, in England, to represent them with the addition of the crimson cap, described as belonging to the crown of the king, and to which it really does belong, though not essentially. Richard III. is generally drawn with this cap, unaccompanied by the crown.

With respect to the number of crosses, strawberry-leaves, &c. it is to be remembered that in the profiles exhibited in pictures and engravings, only half of them are seen.

According to some, the leaves, called of the *strawberry*, are of the *parsley*.

3. A *mitre* is a cleft and pointed cap. An archbishop, who ranks at the head of the dukes, has a coronet similar to theirs, through which the mitre issues; while a bishop, who ranks at the head of the barons, has also a baronial coronet, without its pearls, which surrounds his mitre.

Mitres are never worn by Protestant bishops.

4. The helmet is placed above the shield, and under the crest.

5. *Mantles* and *Mantlings*, are derived from the cloths which antiently made part of the military dress. Mantles are plain in their outline, but usually painted as if lined with fur. Mantlings belong to the helmet. An antient helmet and mantling is still to be seen in the church of St. Margaret, in Westminster.

6. A *chapeau* is an antient cap of dignity, and probably the same with that already spoken of as part of a crown and coronet. At present, it is a decoration only more honourable than the wreath; like which, it usually supports the crest.

7. The *wreath* is a fillet made of two skains of silk, of the colours of the principal metal and colour in the arms.

8. The *crest*, as its name implies, was a badge worn upon the head. It is placed above a shield, but under a coronet.

9. The *scroll* is that which contains the motto, either placed above the crest, or below the arms. Mottos are subject to no rules.

10. The *supporters* are figures standing on the scroll, and seeming to support the shield.

"Marshalling." The hieroglyphics of Heraldry are not confined to *distinctions*, but extend to *alliances*: blazoning pertains more especially to the former, marshalling to the latter department of the heraldic science.

"Alliances," whether *family* or *official*, are expressed either *by impaling*, *by the escutcheon of pretence*, *or by quartering*.

"Impaling" shews the alliance of husband and wife, and the connexion between the office and the officer who holds it. Impaling is most usually effected by placing the two coats side by side upon one shield, divided by a line of partition *in pale*; namely, a line drawn through the middle chief and the middle base points. See Plate II. The arms of the husband are usually placed on the dexter, those of the wife on the sinister side of the escutcheon. The arms of the office take precedency, in like manner, of those of the holder. Formerly impaling was sometimes performed by *dimidiation*; that is, having the two coats, and placing the dexter half of the husband's against the sinister side of the wife's, thus forming one coat. But this method, which is still practised in France, frequently alters, and even totally changes the leading features of the shield, thereby causing ambiguity and confusion.

The "Escutcheon of Pretence," plate II. When an heiress is married, her arms are not to be impaled with her husband's, but are to be borne on an escutcheon of pretence, placed in the centre of the shield. The escutcheon of pretence displays his pretension to her estate; and if the husband has issue by her, the heir of those two inheritors shall bear the hereditary coats of father and mother quarterly.

A charged escutcheon, placed on the centre of a shield, is borne upon other occasions than that of shewing the alliance between a married heiress and her husband.

"Quartering," is the division of the shield by a perpendicular and horizontal line crossing each other, as in plate II. and denotes the alliance between existent and extinct families (or branches of families); or, in other words, it declares the Union of Families. Thus, the son of an heiress does not bear his maternal arms upon an escutcheon of pretence over his paternal coat, but quarters the former with the latter: for in him not only the estates, but the arms of the two families become united. If his maternal coat has previously received in like manner the arms of pre-existent families (or branches of families), he quarters them all; his paternal coat falling into the general conflux. The family of Percy, and that of De Ferrars, are remarkable instances of the conflux of families. The latter quarters not less than one hundred and sixty coats! whilst other ancient families remain without a single quartering upon their escutcheons. When quarterings become numerous, they are admissible only upon banners, or other funeral trophies; the bearer having it in choice to use any one, two, four, or other number, upon his seals, his carriages, or his utensils.

"A bachelor," whilst he remains such, may quarter his paternal coat with other coats, if they belong to him, but he may not impale it till he is married.

"Maid." The arms of a maid is to be placed in a lozenge; and if her father bore any difference in his coat, the same is to be continued: for the mark of cadency of her father's, will denote what branch she is from.

"Widow." The arms of a widow is to be impaled with the arms of her late husband, his on the dexter side, and her's on the sinister side, upon a lozenge, as the example.

"Knight," &c. When a knight of the Garter is married, his wife's arms must be placed in a distinct shield, because his arms are surrounded with the ensign of that order; for though the husband may give his equal share of the shield and hereditary honour, yet he cannot share his temporary order of knighthood with her.

"Commoner and his lady." A commoner married to a lady of quality is not to impale her arms with his own; they are to be set aside of one another in separate shields, as the lady still retains her title and rank. Plate II.

The Arms of Ulster, or, as they are familiarly called, the Bloody Hand, is the badge of Baronetage. This device was granted by James I. at the institution of that order, in memory of the expedient, or the pretence, under which it was instituted; namely, the protection of the province of Ulster in Ireland. These arms are blazoned, *ar.* a sinister hand couped and erect, *gu.* By the rules of heraldry, they ought to be borne on an escutcheon placed on the centre, or in chief, of the paternal coat of the bearer.

The "Hatchment," or "Funeral Achievement," usually placed over the door of a person of distinction deceased, points out the sex, and conjugal connection, as well as the dignity and armorial distinctions of the defunct. See Pl. II. These circumstances are denoted by the form and accompaniments of the field, and the *colour of the ground* of the hatchment: thus,

"For a bachelor,"—the paternal arms are painted upon a shield, and accompanied with Helmet, Crest, and Motto, and with the ground of hatchment (namely, the vacant canvass on each side of the shield) *all black.*

"For a single woman,"—the paternal arms are painted upon a *lozenge,* with no other accompaniment, or ornament, than a gold-cord, loosely knotted, encompassing the field: the ground, in this case, is also *all black.*

"For a widow,"—the paternal arms of the defunct are impaled with those of her late husband, in a lozenge, with a fancy gold-ornament round it; but with no accompaniment; the ground all black.

"For a married woman leaving a husband,"—her paternal arms impaled with those of her husband, are painted upon a shield, without the armorial accompaniment; the sides of the shield being only ornamented. In this case the sinister side of the ground is black, to denote the death of the wife; the dexter side white, to shew that the husband is living.

"For a married man leaving a widow,"—the arms as before, upon a shield, with the accompaniments of helmet, crest, and motto: the dexter side of the ground, in this case, being black; the sinister, white.

[illegible] [illegible] [illegible] [illegible] and co-[illegible] connection, as well as to [illegible] armo-rial distinctions of the defunct. [illegible] These [illegible] are denoted [illegible] of the [illegible] thus,

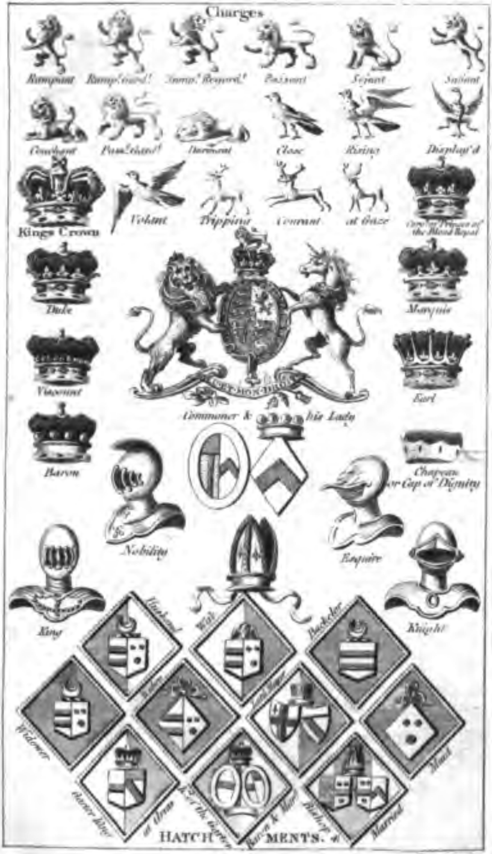
"For [illegible] arms are paint-[illegible] with Helmet, Crest [illegible] and [illegible] the ground of hatch-[illegible] the vacant canvass on each side of [illegible]

[illegible] paternal arms are [illegible] no other accompani-ments [illegible] gold cord, loosely knot-[illegible] ground, in this case [illegible]

[illegible] the paternal arms of the de-ceased [illegible] with those of her husband, in a [illegible] with a fancy gold-ornament round it, but with no accompaniment; the ground all [illegible]

[illegible] husband." — [illegible] her hus-[illegible] that the armo-rial [illegible] shield being only [illegible] the sinister side of [illegible] denote the [illegible] of the [illegible] white, to shew that the [illegible]

[illegible] married man leaving a widow,"—the arms [illegible] upon a shield, with the accompa-niments of helmet, crest, and motto: the dexter [illegible] ground, in this case, being black; the sinister [illegible] white.



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"For a man who dies, leaving a second wife,"—his shield of arms (uot impaled) together with the accompaniments, are painted upon a black ground. On the dexter side of the shield is placed a small funeral escutcheon, bearing his paternal coat impaled with that of his first wife, the sinister side of this escutcheon being black, to denote her death; and on the sinister side of the shield is placed another escutcheon, bearing his arms impaled with those of his second wife; the dexter side of this escutcheon, being painted black, to denote his death; the sinister, white, to shew that his second wife is still living.

"The peer," is distinguished by his coronet and supporters:

"The baronet," by his badge:

"The knight companion," by the motto of his order;

And "the bishop," by his mitre. In this case it is observable, that as, by the rules of heraldry, the arms of the office take precedency of those of the holder, the arms of the diocese are always impaled on the dexter side, those of the bishop on the sinister side, of the escutcheon: consequently on the hatchment for a bishop the sinister, and not the dexter side of the ground is painted black.

Heriot, in feodal customs, a tribute of goods and chattels, payable to the lord of the manor, upon the decease of a copy-holder.

Hermetical sealing, in chemistry, a manner of closing glass vessels in so accurate a manner, that even the most subtile spirits cannot escape. This is usually performed by heating the neck of the vessels in the flame of a lamp, till it be ready to melt, and then with pincers, twisting it close together.

Hermit, (a corruption of *eremit*, which is derived from a Greek word signifying "a wilderness," or "desart,") a name given to a person who passes his life at a distance from the ordinary abodes of men. There is nothing in the etymology of the word, it is obvious, nor is there, in the early history of hermits, that renders perfect solitude essential to the denomination. It was common with the antient hermits, as in the example of St. Anthony, to have a number of associates.

Heron, in natural history, a bird which feeds upon fish, and commonly builds in cliffs on the sea-shore, though sometimes in lofty trees. This bird, which is very voracious, is extremely hostile to the interests of those who have fish-ponds. It is said that it will eat fifty dace and roaches, of a moderate size, in a day; and one thousand store-carp in a year. It is sometimes caught by a bait, which should be fastened, by a strong line, to a stone of sufficient weight. The heron was formerly much esteemed as a food. It is a long lived bird. Individuals have been known to live more than sixty years.

Herring, in natural history, a fish well known as a food. The name *herring* is derived from the German *here*, an army; in allusion to the countless numbers which compose the shoals or bodies in which they swim. For the herring-fishery, see Fishery.

Herschel, the name by which astronomers in general call the planet discovered by Dr. Herschel in March 1781. Its other names are Georgium Sidus, and Ouranus or Uranus. The short-hand mark or character for this planet is ♅, that is a Roman H, as the initial of the name of the discoverer, the horizontal bar being crossed as an emblem of Christianity, meaning thereby that its discovery was made during the Christian æra, in contradistinction to the others which were known long before that period. This planet is the most remote of all that are known; it is less than Jupiter and Saturn, but larger than all the rest. Its light is of a bluish-white colour, and its brilliancy between that of Venus and the moon. By persons endued with a keen sense of sight it may be seen with the naked eye, but to have a good view of it, a telescope that magnifies 300 times is required. The periodical time of this planet is about 83⅓ of our years.

Its diameter - - - - - - -	35107 miles
Proportion of its diameter to that of the earth - - - - - - - -	4.317 : 1
Its bulk to the earth's - - - - -	80.492 : 1
Its density - - - - - - - - -	0.220 : 1
Its quantity of matter - - - - -	17.740 : 1

Heavy bodies fall on its surface 18 feet 8 inches in one second of time.

There are six satellites belonging to this planet, and the periodical revolutions of these are completed in the following respective times.

st.	d.	h.	m.	sec.
I	5	21	25	0
II	8	17	1	19
III	10	23	1	29
IV	13	11	5	2
V	38	1	49	0
VI	107	16	40	0

Hesper, in astronomy, the evening star; an appellation given to the planet Venus, when it sets after the sun.

Hexagon, in geometry, a figure of six sides and angles.

Hexaedron, in geometry, one of the five regular solids, being nearly a cube. See Body.

Hiatus, properly signifies an opening or gap, and in that sense is used for the defects of manuscripts; but it is also applied to that opening of the mouth and consequent harshness of sound, which occurs when one word ends, and the next begins, with a vowel.

Hide, a word formerly used in land-measure, for such a space as might be ploughed with one plough; or, as much as would maintain the family of an *hide*, or mansion-house. According to some, a *hide* was sixty acres, others make it eighty, and others a hundred. The quantity, very probably, was always determined by local usage only.

Hierarchy, a term literally signifying *holy government*, and applied sometimes, to the supposed polity, or social constitution, among angels, and sometimes to church-government.

Hieroglyphics, in Egyptian history, symbols or characters by which the earlier philosophers expressed their doctrines; and which, when antiquated, and no longer understood by the people at large, were accounted sacred. Hieroglyphics differ from letters, inasmuch as the former represent things by likenesses, real or fanciful. From symbols of this kind, all letters have been formed. An inscription on the temple of Minerva, at Sais, affords a specimen of hieroglyphics. An infant, an old man, a hawk, a fish, and a river-horse, expressed this moral sentence: "You who come into the world, and you who go out of it, know this that the gods hate impudence."

HIGH ADMIRAL, see ADMIRAL.

HIGH TREASON, see TREASON.

HIGHNESS, a quality, or title of honour, given to princes. The kings of England, before James I., were not saluted with the title of "majesty," but that of highness only.

HIPPODROME, in antiquity, a course for chariot and horse races. There are in England some vestiges of similar courses, the most remarkable of which is that near Stonehenge. This hippodrome occupies a tract of ground extending about two hundred druidical cubits, or three hundred and fifty feet, in breadth, and six thousand druidical cubits, or more than a mile and three quarters, in length. It runs directly east and west, and is completely inclosed with a bank of earth. The goal and career are at the east end. The goal is a high bank of earth, raised with a slope inwards, on which the judges are supposed to have sat. There is one about half a mile to the southward of Leicester; another near Dorchester; a third on the banks of the Lowther, near Penrith in Cumberland; and a fourth in the valley without Royston, in Surry.

HIPPOPOTAMUS, river horse, is found only in Africa. It has been chiefly discovered on the banks of the rivers Nile, Niger, Gambia, and Zaire. It is sometimes seen in salt-water. In Guinea, the rivers, lakes, and marshy grounds afford numbers of them, and in some parts of Caffraria they are still more common. Although an inhabitant of the waters, the hippopotamus is well known to breathe air like land animals. On land he finds the chief part of his food, though he occasionally feeds on aquatic plants; but he not unfrequently leaves the water, and commits wide devastations through all the adjacent fields. His depredations are usually carried on in the night: He descends to the bottom of the deepest river, and walks along it with the same slow and stately pace, as if he were on the land. He cannot however continue under water more than a certain length of time, when he ascends to discharge the water from his lungs and draw in fresh air. He is never offensive unless when accidentally provoked or wounded, but when his anger is roused, revenge is fully within his power, for he can dash a boat to pieces with his teeth, or if the river be not deep he will raise one on his back and overset it. The Egyptians are said to destroy the animal with the following artifice; they scatter a vast quantity of peas in his tract, which he eagerly swallows whole, the dryness of the food disposes him to drink, the peas swell in his stomach and kill him. See pl. Nat. Hist. fig. 22.

Hirundo, the swallow in natural history, a genus of birds of the order passeres, of which there are 38 species. Of all the feathered tribes, that of the swallow kind is most on the wing. Flight seems its natural, and almost necessary attitude. In that state it feeds, and bathes itself, and sometimes procreates and nourishes its young. Their wings are long and adapted for continued flight, and their tails are large and forked, to enable them to turn with agility, and to be masters of their flight even in its greatest velocity. The nidification of this tribe is a curious part of their economy. It is wonderful to observe with what degrees of architectural skill, Providence has endued birds of the same genus, and nearly correspondent in their modes of life. While the swallow and the house martin discover the greatest address in raising, and securely fixing, crusts of loam, of which their nests are formed, the bank-martin makes his hole in the sand, which is serpentine, horizontal, and two feet deep. The nests of the Hirundo esculenta, or esculent swallow, are reckoned a most exquisite delicacy among the Chinese, who make them into soups and use them in their most delicate dishes.

HISTORIOGRAPHER, a professed historian, or writer of history. The *historiographer to the king*, in England, is an officer under the lord-chamberlain, whose salary is £200 per annum. There is a similar officer, with a similar salary, in Scotland.

HISTORY, in its general sense, consists of all that kind of knowledge which belongs to narrative; and stands opposed to science, which is demonstrated knowledge, and to philosophy, which is matter of opinion. Literally, this word is applicable only to that information which the writer gives on his own knowledge. Those who write *histories* of things or events which they have not themselves seen, are mere compilers of the testimonies published by others.

History, then, denotes narration and description of every kind; but, as pre-eminent, the narrative of human affairs is styled *history* absolutely, while narratives, or descriptions, of other objects, are distinguished by specific additions; as *natural history*, the description of nature, and narrative of its events.

With regard to human affairs, also, the application of the term *history* is still farther restricted to the narrative of political occurrences only. To entitle the account of the transactions of the government, the wars and the negotiations of a nation, its *political history*, would be thought a pedantic refinement; and to call that of its ecclesiastical occurrences, or domestic manners, by the general term *history*, would be censured as wanting in precision.

If the reader, as may probably happen, is indifferent to this literary question, the subject is nevertheless of importance to him, in another point of view. It is incalculable to what an extent the ideas of mankind are misled, by the simple circumstance of taking that which is *political history*, in the same sense with *general history*. Readers frequently complain that *history* is full of nothing but wars and political machinations; but they should reflect these are the very subjects of which *history* (commonly so called) proposes to treat: years of peace are but so many blanks, over which the historian passes with a dash of his pen, and often a sneer of contempt; while a single day of trouble, or a plot, or a rumour of a plot, is a theme for many a volume.

II. History is naturally interesting in the highest degree; we cannot but take the most lively concern in the transactions of our fellow creatures; and, if time be measured by the succession of ideas, this study certainly antedates our lives, and makes us live through the ages that have preceded our birth. Nor is the importance of history inferior to its fascinations; it is the source, immediate or mediate, of almost all our ideas. No man who is acquainted with facts, can form a theory without taking these into the account; we seldom speak or think of human nature, without some reference to the actions which we believe mankind to have performed; and, are not the attributes, nay, the very conduct, of the Deity himself, daily argued on historical ground?

III. To those who are desirous of studying history with advantage, it is always recommended to make geography a correlative pursuit; and farther, to have at hand, a map of the country, the history of which they are reading. The learner cannot be too sedulous, also, to reduce the medley of events into order; and to form, in his mind, an accurate abridgment of the narrative. It is not here recommended to commit any such abridgment to paper (for, in that case, it will presently be forgotten, and the student's knowledge be to be found, not in his head, but in his escritoir;) nor, ought historical reading to be confined to that of the abridgments of others: these have their use; but we cannot know too many particulars: it will often happen, that some unnoticed circumstance overturns, in the mind of a man who thinks for himself, all the specious fabric that partial historians have set up.

IV. The latter consideration will properly introduce a few remarks, of the justice of which, and of many others of a similar nature, it is infinitely desirable that the historical inquirer should be convinced. Historians are commonly partizans or poets, or, perhaps, it should be said, both; and the generality of histories are written with nearly all the licence of romance. Their readers, therefore, should be incessantly on their guard against the fallacies attempted to be imposed upon them by prejudice, or by imagination. In this high, but intricate and perplexing, concern, two rules of judgment, that can seldom be useless, present themselves: firstly, it will be well to analyse the particulars recited in a smooth composition, and observe whether they are all of that nature which admit of complete evidence? whether, no artificial turn be given by a presumptuous use of epithets, or barefaced interpolations? and, whether the whole is, or is not, at the mercy of a writer, who obtrudes his own notions at every step, and talks of weak kings, and wicked ministers, or stubborn princes and servile courtiers, instead of detailing facts from which the reader may judge for himself?

Secondly, if the student be young in the research, he cannot too strongly bear in mind the uncertainty of all historical information. Neither understanding nor honesty are always securities for the veracity of the writer. It were endless to recount the forms in which error forces itself upon him whose record is built upon the authority of others; and there are many occasions, on which even the personal evidence of the historian ought to command but little of implicit belief.

Among the numerous causes of historical falsehood, of which it would be useful to take the most scrutinizing view, there is one which appears eminently deserving of remark; and this is, the extraordinary care that, in public as well as private life, must frequently be employed, by those who know it best, to prevent the publication of the truth. Add, that the heroes of history depend, for the interpretation of their conduct, upon circumstances wholly independent on their virtues and vices. If Protestantism had not been subsequently established, would Mary have descended to posterity with the cognomen of The Bloody? and is no part of the traditionary character of Charles II to be attributed to the puritanical temper of the age in which he lived, and to the jaundiced eyes of subdued roundheads? or of that of Cromwell, to the event of the restoration?

History, then, must be regarded with due consideration of the circumstances under which its composition has taken place. Thus, we must always suspend our belief in the vices of a deposed prince, or a fallen party; we must receive the epithets, *vast*, *magnificent*, *glorious*, and their opposites, with caution, and look for measurements and facts; we must suspect the history of the past, on account of want of information, and of the present, on that of want of honesty; [illegible] first is often falsified through ignorance, and the second through party spirit; and we must suspect the history of all times, because of prejudice, from which no historian has been free.

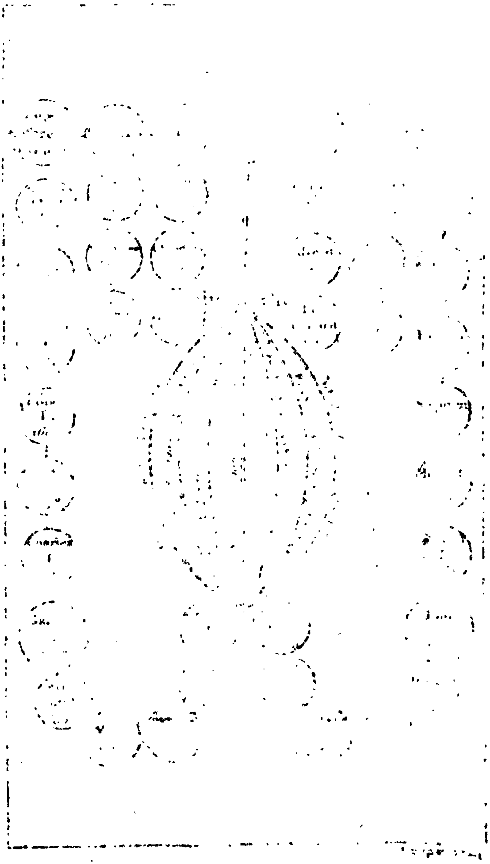
He that writes the history of his own times, is not only in danger of being partial, but of unacquaintance with many things, which time tardily brings to light; and he that writes the history of a former period, is wholly ignorant of that of which he pretends to speak, and dependant on the *dicta* of others. If his authorities are few, half the truth is more than he ought to hope for; and if they are numerous, they almost uniformly belie each other.

There have been many mechanical helps composed to the attainment of history, as well with regard to the chronological order of events, as with respect to the several revolutions that have occurred in the world, and in particular empires, kingdoms, and states. Such is Priestley's chart which embraces general history; such is the annexed PLATE as it relates to the several changes that have taken place in the government, and in the succession of monarchs of England. The reader will see in one view, and will, with a little attention, remember every revolution that has occurred in Britain, from the time when the island was in the possession of the original inhabitants to the present period.

HISTRIONIC ART, that of acting in dramatic representations. *Histrio*, in antient Rome, signified an actor or comedian; but more especially a pantomime, whose talents were exerted in gesticulations and dancing.

HOB-NOB, or *hab-nab*, a cant phrase, derived from *hap ne hap*, or "happen what may."

HOBSON'S CHOICE, a proverbial expression, used to denote, no choice at all. This proverb originated at Cambridge; where, in the beginning of the seventeenth century, one Thomas Hobson, a carrier, was accustomed to let saddle-horses to the scholars; and who, desirous that every horse should have its proper share of rest, would never allow one to be hired out of its turn. His inflexibility often clashed with the whims of his customers; but he was positive; they must either take the horse he was willing to let, or go without any: whence the saying, Hobson's choice: this or none. Hobson's conduct, in this branch of his profession, evidently marked a degree of character; but his celebrity does not rest here. At his sole expence, he

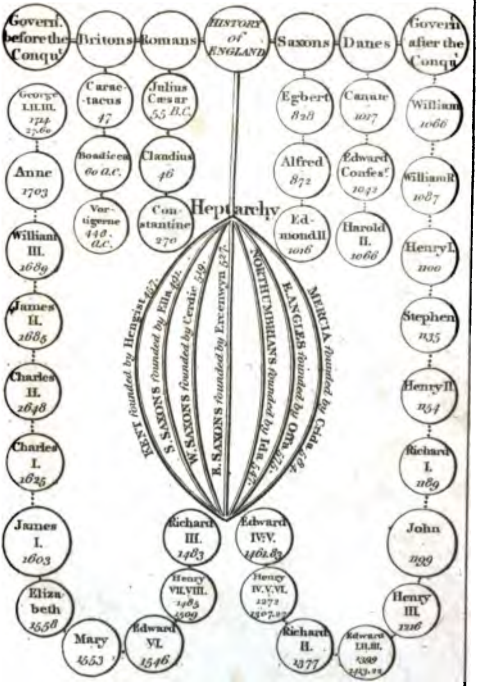


[illegible]

[illegible] beginning of [illegible]

[illegible] its [illegible]

[illegible] ; they must [illegible] with [illegible] let, or [illegible] the [illegible], Hobson's [illegible] in this [illegible] of [illegible] a degree of [illegible] character [illegible] est [illegible] has [illegible]



Cooper sculp.

Published by J. Harris, S^t Pauls C^h Y^d. 1811.

brought an aqueduct into the town of Cambridge; and, in 1614, erected a stone conduit, which, after his death (1630), received an inscription commemorating the benefaction.

Hogshead, in mensuration, a measure of capacity, containing sixty-three gallons of wine, and fifty-four of beer.

Hoke-day, hocke-day, or hock-tuesday, in the ancient customs of England the second Tuesday after Easter-week, and a festival celebrated with great solemnity, during several ages, in honour of the redemption from the Danish yoke. On or about this day, A. D. 1042, Hardicanute died suddenly; and his death was followed by an insurrection of the English, and general massacre of his countrymen, the Danes. In this slaughter, which raged from one end of the country to the other, the English women took the principal part; an honour, in right of which it is still customary for them, in some counties, to stop all passengers, with ropes and chains, and demand a trifling gratuity, wherewith to make merry. Farther to assist the festival, a duty, called *hock*-tuesday-money, was antiently paid to the lords of manors, that their tenants and bondmen might celebrate the day.

Holiness, a title of quality attributed to the Pope, who is stiled, *your holiness*, or, *holy father*: in Latin, *sanctissime*, or, *beatissime pater*.

Holland, formerly a celebrated republic of Europe, and principal of the Dutch States, or as they were commonly called, the Seven United Provinces. This country is bounded on the north and west by the German Ocean, on the east by the Zuyder See and the State of Utrecht, and on the south by the river Meuse and Brabant. In the year 1795, the United Provinces were invaded by the French, and their government and constitution were overthrown; about the year 1802, the Provinces were denominated the Batavian Republic, a name which gave place to that of the Kingdom of Holland, which was divided into the following departments: viz.

	Chief Towns.
1. Groningen - - - - - -	Groningen.
2. Friesland - - - - - - -	Leewarden.
3. Over Issel - - - - - -	Zwol.
4. Guelderland - - - - -	Arnheim.
5. Utrecht - - - - - - -	Utrecht.
6. Holland - - - - - - -	Hague.
7. Brabant - - - - - - -	Bois-le-duc.
8. Zealand - - - - - - -	Middleburg.

It is also divided into four military divisions: the *first* comprizes the department of Holland, Brabant, and Utrecht: head quarters the Hague. The *second*, the province of Zealand: head quarters at Middleburg. The *third*, the departments of Friesland and Groningen, head-quarters Groningen. The *fourth*, the departments of Guelderland and Over-Issel, head quarters at Deventer. Buonaparte placed his brother Louis on the throne of Holland, but in 1810 he disapproved of the emperor's measures, resigned his crown and left the country, setting forth his reasons for this conduct in a well drawn declaration. Since then Buonaparte has united Holland to the French empire, in which the oppressed inhabitants have been obliged to concur.

Holland, in commerce, a fine and close-wove linen-cloth, so called from its having been first manufactured in *Holland.*

HOMAGE, in law, the submission, loyalty, and service which a tenant promised to the lord of the fee, upon his first admission to the land. In the general, it signifies any profession of submission, loyalty, and service.

HOMICIDE, in law, the killing a man. Three kinds of homicide are distinguished : I. justifiable, II. excusable, III. felonious.

I. *Justifiable homicide* may take place in various ways ; as, where an officer puts a man to death by command of the law, or, through necessity, in performing part of his duty ; or where an individual kills another, in self-defence, or for the prevention of any capital crime, which that other was about to commit.

II. *Excusable homicide* may be through misfortune, or for self-preservation, by chance medley. In either of these cases, the penalty is forfeiture of goods ; but this is saved by the king's pardon.

III. *Felonious homicide* is the killing a human creature, without any excusable cause ; as well the killing a man's self, as the killing another. The killing another may be 1. *manslaughter*, or 2. *murder.*

HOMILY, in divinity, originally signified a discourse upon some point of religion, more familiar than a sermon. Latterly, it seems to denote an established discourse, in opposition to the temporary one of an individual ecclesiastic.

HONE, a fine kind of whetstone, used for setting or giving an edge to sharp instruments of steel. It is a petrifaction of holly-wood, brought about by continued immersion in water. In Oxfordshire, this wood is said to be petrified in a peculiarly short space of time.

HONEY, a saccharine substance, collected by bees from the flowers of various plants, and deposited in their comb. The honey is extracted either by expression, or by placing the comb in a warm situation, when it liquifies and comes away in a pure state. The best honey is of a thick consistence, and a whitish colour, inclining to yellow, and of an agreeable smell and taste: but both the colour and flavour are said to differ, according to the plants from which it has been collected. Honey appears to consist of vegetable juices, either oozing, with a portion of their essential oil, from flowers, or previously collected from the leaves and branches of trees, by vine-fretters, and then known by the name of honey-dew. These juices, the bees transport by means of their probosces; and, after giving them a certain preparation, probably in their stomachs, deposit them in their cells. That the juices do undergo some preparation, appears almost undeniable, since the honey wrought by young bees is white, and more pure than that produced by old. The former is called *virgin honey*.

HONEY-*comb*, a waxen structure, full of cells, constructed by the bees, to deposit their honey and eggs in. The structure of the honey comb seems one of the most surprizing parts of the works of insects, and the materials of which it is composed, which though evidently collected from flowers, yet do exist in them in that form, a circumstance which has given great cause of speculation to the curious. The regular structure of the comb is equally wonderful. When the several cells are examined, it should seem that the nicest rules of geometry have been consulted, and that all the advantages that could be wished are found in it. Each cell consists of six plane sides, which are all trapeziums, but equal to each other: the bottom of the cell is contrived with three rhombuses, so disposed as to constitute a solid angle, under three equal angles, hence a less quantity of surface is sufficient to contain a given quantity of honey than if the bottom had been flat. The method of making two sorts of cells in each comb is also admirably contrived to save the expence of wax, since had they been made single, every comb must have had its peculiar base, and every set of cells their bottom of wax, whereas one bottom now serves two cells. This structure occasions a great saving of wax, and strengthens in a high degree the whole work.

Honey-dew, a saccharine substance, found upon the leaves of certain trees, and once supposed to be a dew, falling from the clouds. The abbé Boissier, in a paper read before the society of sciences, at Montpelier, has illustrated this subject with considerable precision. He has found that there are two kinds of honey-dew, the one produced by transpiration, during a sultry heat, from the leaves of particular genera of trees; while the other is the excrement of the small insect known by the name of *puceron*, or *vine-fretter*.

Bees are fond of both kinds of honey-dew, but particularly of the latter. The vine-fretters finding the greatest plenty of juice about the middle of summer, afford, also, at that time, the greatest quantity of honey-dew; and, in autumn, when, however, it is less in quantity, the bees prefer this to the honey of the flowers then in season. It is, indeed, their chief resource for subsistence after the spring flowers, and transpiratory honey-dew, are gone; and, as the trees, though pierced to the sap in a thousand places, do not seem to suffer in the least, the husbandman who destroys the insect, probably mistakes his interest.

Honi soit qui mal y pense, the motto of the order of the garter. In the chivalrous spirit, it contains a defiance: "Shame to him that thinks evil hereof!"

To what the allusion is made, admits of a question. It may mean the cause of the Cross; or that of Edward in his war with France; or merely the garter itself; or the incident of the fall of that of the countess of Salisbury. See *Garter, Order of the.*

Honour, in moral philosophy, denotes *worth*.

Honour, among men of the world, is the same thing with *virtue*, among philosophers; and *righteousness*, among religionists. That uprightness, which the last inculcates on the ground of avoiding the wrath, and obtaining the favour, of heaven, the second teaches on the principle of self approbation, and the first on that of outward reputation.

Honour, in high life, and among those who would affect to rank among the fashionable world, has a meaning which it is easier to illustrate than define. It is subject to a system of rules, called the law of honour, constructed by people of fashion, calculated to facilitate their intercourse with one another, and for no other purpose. Consequently nothing is considered as inconsistent with honour but what tends to incommode this intercourse. Hence profaneness, neglect of the duties of religion, cruelty to servants and rigorous treatment of dependants, want of charity to the poor, injuries done to tradesmen by insolvency or delay of payment, with numberless examples of a similar kind, are accounted no breaches of honour, because a man is not a less agreeable companion for these vices, nor the worse to deal with in those concerns which are usually transacted between one gentleman and another.

Honour, in law, a superior seigniory, to which other lordships and manors owe suit and service, and which, itself, holds of the king only.

Honour, in polity, the same with nobility. As the origin of hereditary nobility was territorial, the preceding article will show why a *title* should be called an *honour*.

Honour, *Court of*, a court antiently held by the earl-marshal of England, for inquiring into questions of honour.

Honours of war, marks of respect allowed by the besiegers to a garrison that is able to hold out if these be refused; and which consist in its marching out with shouldered arms, drums beating, colours flying, and all its baggage. Its arms, however, are usually laid down, before it quits the glacis.

Honourable, a title of quality attributed to the younger children of earls, and the children of viscounts and barons; to persons enjoying places of trust and honour; and, collectively, to the house of commons, and to the East-India company.

Honorable, *Amende*, in the ancient polity of

France, a disgraceful sort of punishment. The defendant was delivered up to the common hangman, who stripped him to his shirt, put a rope about his neck, and a wax taper in his hand; and being led, in this condition, to the court, he there begged pardon of God, the king, and the court.

Hookah, a smoking utensil of peculiar construction, in use among the nations of the East. The hookah consists of a small vessel containing water, and two tubes, or one tube divided in the middle where it joins, and opens into the water-vessel. The one tube, or part of the tube, stands in an erect position, and on the top of this is placed the tobacco; the other projects obliquely, and is that to the end of which the smoker applies his mouth. The use of the hookah is, its cooling the smoke, which is here drawn through water. The more luxurious employ rose-water; and, with these, the whole utensil is frequently of the most costly construction; the water-vessel being of silver, set with precious stones. The smoking-tube, which is of extraordinary length, and pliant materials, is for these reasons called the snake.

Hooker, in marine architecture, a Dutch vessel, built like a pink, but rigged like a hoy. The hooker is from fifty to two hundred tons burden; with a few hands, it will go to the East Indies; and is esteemed for its quality of lying nearer to the wind than is possible to a vessel with cross-sails.

Hoop, a piece of pliant wood, or iron, bent into a circular form, and commonly used for securing casks, and similar vessels. Driving *a hoop*, a boyish exercise, highly serviceable for inducing a free use of the limbs, and giving tone to the nerves.

Hop, a well known plant, much used in brewing, said to have been brought into England from the Netherlands in the year 1524. There are many kinds, but the two best sorts are the white and grey kind: the latter is a large square hop, more hardy, and is the more plentiful bearer, and ripens later than the other.

Horary *circle* of a globe, is fixed upon the brazen meridian, divided into 24 hours, having an index moveable round the axis of the globe, which upon turning the globe 15 degrees, will shew what places have the sun an hour before or after us: and will also point out the hour of the day or night all over the world at any given moment.

Horary *motion* of the earth, the arch it describes in an hour, which is nearly 15 degrees. Hence in reducing motion into time, if 15° is equal to 1 hour, 1° is equal to 4′; therefore the clocks at places 15° East of London are an hour faster than those of London, and the clocks at places, 15° West of London, are one hour later than those of London.

Horde, is used for a company of wandering people, who have no settled habitation, but stroll about, dwelling in waggons, or under tents, to be ready to shift, as soon as the provisions of the place fail them: such are the tribes of Tartars, &c. who inhabit beyond the Wolga, in the kingdom of Astracan and Bulgaria.

Horizon, that great circle which divides the heavens and the earth into two equal parts or hemispheres, distinguishing the upper from the lower. The horizon is either sensible or rational: the *sensible* horizon is that circle which limits our prospect. The *rational* horizon is a great circle of the apparent celestial sphere, dividing it into two equal hemispheres, and serving as the limits of the elevation or depression of celestial objects.

HORN, in physiology, an hard substance growing on the heads of several animals, and serving them as weapons of defence. The horn of an animal is of the same nature as its gelatinous matter; and is only that matter charged with a lesser quantity of water, and a larger one of earth, and sufficiently condensed to be of a solid consistence. Horn digested with water, in Papin's digester, is reducible to a perfect jelly. Horn is a considerable article in commerce, as being the material of many manufactures; as lanthorns, ink-horns, combs, and knife-hafts. Artificers in horn, are called *horners*.

HORNPIPE, a musical instrument, common in Wales. It is a pipe of wood, with holes at stated distances, and a horn at each end; the one, to collect the wind blown into it by the mouth, and the other, to disperse the modulated sounds.

HOROLOGY, is that branch of science which enables us to measure the portions of time as they pass. We judge of the lapse of time by the succession of sensible events, and the most convenient and accurate measures of its quantity are derived from motions, which are either uniform, or repeated at equal intervals. Of the *former* kind the rotation of the earth on its axis is the most exact, and the situation of the earth with respect to the fixed stars, or sun, constitutes the means for determining the parts of time as they follow each other. See DIAL. Of the *latter* kind the rotation of machinery consisting of wheel-work, moved by a weight or spring, and regulated by a pendulum or balance, affords instruments of which the utility is well known. The term horology is at present confined to the principles on which the art of making clocks and watches is established. In this article will be given an account of the structure of a common eight day clock, and under the head WATCH, the machinery of that most common and useful article will be given.

Clocks were invented to measure time and all its subdivisions with great exactness; these consist of a combination of wheels, and they are usually regulated by the uniform motion of a pendulum.

The English word *clock* is derived from the German, or from the French *la clocke*, a bell, against which it usually strikes the hour indicated.

Clocks and watches usually divide the hours into minutes, one hand, or index, pointing out the hour, the other the minutes. Some, however, carry the divisions, by means of a third index, to seconds.

In many cases the pendulum cannot, on account of its length and other circumstances, be made use of; hence the invention of watches, or as they were formerly called, pocket-clocks.

One was invented by Mr. George Graham, which divided the second into sixteen parts, which was intended to measure small portions of time in astronomical observations, the time spent in the descent of falling bodies, the velocity of running waters, &c.

In plate Miscellanies, Fig. 20, is such a representation of a clock as you would have by opening one of the side doors in order to look at the wheel-work, S S, T T, is the frame for the support of the wheels, &c. P is a weight suspended by a rope that winds about the cylinder, or barrel C, which is fixed on an axis *a a*: the motion of D D communicated by the weight P, turning the barrel C, is transferred to the small wheel or pinion D, which turns the wheels E E, N, N, *q*, *q*, these turn the wheels *e* O *p*. The pinion *e* turns the wheel F F, which turns f, and transfers the motion to G H, the balance wheel, and hence to the palettes, I, K, and by means of the fork *X U* riveted on the bar *r s* motion is given to the pendulum A B, which is suspended on a hook A. Thus the weight P gives motion to every part of the machinery, and would run down with accelerated motion, were it not for a racket wheel fastened to the inner part of the wheel D, which renders the motion uniform. The wheel E E revolves in an hour, the pivot *c* of this wheel passes the plate and is continued to *r*; upon the pivot is a wheel N N with a socket fastened in the centre, and upon the extremity of this socket *r* the minute hand is fixed. The wheel *q q* turns once in twelve hours only, and on this, at z the hour-hand is fixed. Thus you perceive that though to outward appearance, both hands of a clock and watch seem to be fastened on one axis, they are in truth on different axes, the minute-hand being carried round by the axis to which it is fastened, and the hour-hand by the axis to which *q q* is fastened.

To shew how the wheel E, to which the minute hand is fixed, makes but one revolution in an hour, it must be observed, that it depends on the length of the pendulum, and on the number of vibrations it makes in an hour: these in a common table clock are 7200, and this being known it depends entirely on the number of teeth in the wheels and pinions. The balance wheel G H has 30 teeth, and will turn once in the time that the pendulum makes 60 vibrations, for at every turn of the wheel the same tooth acts once on the palette I, and once on the palette K, which occasions two separate vibrations in the pendulum, and the wheel having 30 teeth must occasion twice 30, or 60 vibrations, of course the wheel performs 120 revolutions in an hour, because 60 vibrations which it occasions at every revolution are contained 120 times in 7200, the number of vibrations performed by the pendulum in an hour.

The wheel E E contains 72 teeth, this revolves in an hour, it turns the pinion *e*, which has 6 teeth; this pinion therefore, revolves 12 times while E E revolves once. F F has 60 teeth, which revolves with *e*, and turns the pinion *f*, which has 6 teeth, 10 times for every revolution of its own; therefore the pinion *f*, and of course the wheel G H turns 10 times 12 or 120 times while E turns once, but as the wheel G H occasions 60 vibrations of the pendulum during one of its revolutions, it must in an hour occasion 60 × 120 or 7200 vibrations, which is the exact number that the pendulum ought to make in an hour: consequently the wheel E performs but one revolution in an hour.

The wheel N is turned in the same time that E revolves; it contains 30 teeth, so also does O, which is turned by N in the same time, which turns *p*, a pinion having six teeth: this pinion works in the wheel *q q*, to which the hour-hand is fixed. The wheel *q q* has 72 teeth, and therefore revolves once only while its pinion goes 12 times round; but the pinion goes just as fast as the wheel E, by which the minute-hand is moved, of course the hour-hand revolves as it ought, only once, while the minute-hand revolves 12 times.

The weight P is not a necessary part of a clock, because small clocks, as those which stand on tables or brackets, do not admit of a weight to run down: these, then, are moved with a spring, contained in the barrel, instead of a weight, and cord to be wound on it.

In Fig. 21, we have a different view of the inside of a clock. Here are two sets of wheels; the set connected with the barrel A is that which we have already described; the other set, connected with B, is the striking part. These sets, or trains of wheels, are independent of one another, and each has its first mover A and B; the train A A is constantly going, to indicate the time by the hands on the dial plate: but the train B B, is only put in motion every hour, and strikes a bell to tell the hour. C is the barrel of the going part, having a catgut or cord *x*, wound round it, suspending the weight W, which keeps the clock going, in the way described above. The first mover is the barrel B, having a click, such as has been described with regard to Fig. 20. To this barrel is attached a wheel *b*, called the count-wheel, having 78 teeth, it turns a pinion of 8 teeth, which is connected with the pin or striking-wheel *x*, of 64 teeth, acting also upon a pinion of 8 teeth, belonging to the detent or prop-wheel O, of 48 teeth; this turns a pinion of 6, on the same arbor with a thin vane of metal, called a fly, intended, by its resistance to the air, to regulate the velocity of the wheels.

The wheel *x*, has eight pins projecting from it, these, as they pass by the tail of the hammer *n*, raise it up; the hammer is returned violently when the pins leave its tail, by a spring *m*, pressing on the end of a pin put through its arbor, and strikes the bell. There is another spring, *l*, which lifts the hammer of the bell the instant it has struck, that it may stop the sound. The eighth pin, in the wheel *x*, passes by the hammer 78 times in striking the 12 hours, because $1+2+3+4+5+6+7+8+9+10+11+12=78$, and as its pinion has eight leaves, each leaf of the pinion answers to a pin in the wheel *x*. As the great wheel has 78 teeth it will turn once in 12 hours. The wheel x, having 64 teeth, eight of, them correspond to one of the pins for the hammer, and as the pinion of the next wheel *o*, has eight teeth, the wheel itself will turn once for each stroke of the hammer. As *o* turns once for 6 revolutions of its pinion; and as P turns once for 8 revolutions of its pinion of 6 leaves, the fly *f*, will $6\times8=48$ times for one revolution of the wheel *o*, which is equal to one stroke of the hammer.

Besides the wheels, in the striking train, belong several other parts; as the ratchet, a wheel with twelve large fangs, running concentrical to the dial-wheel, serving to lift up the detents every hour, and make the clock strike; the hammer which strikes the bell; and the bell itself.

HORSE, we have referred from the generic term EQUUS, to the present article, for an account of this most useful and interesting animal, meaning at the same time to notice some other of the species, of which there are six besides varieties. The common horse, or as he is termed in the Linnæan system the Equus Caballus, is found in most parts of the world. In Africa horses still maintain their original independence, and range at pleasure in herds of several hundreds, having always one or more as an advanced guard to give an alarm against the approach of danger. The notice is expressed by a sudden snorting, at which the main body gallops off with the most surprizing swiftness. In Arabia almost every man possesses his horse, which lives in the same apartment with himself and family, and is considered as constituting an important part of it. It is fed with the most regular attention, is cleaned with an incessant assiduity, and is never, on any account, ill treated. An Arab occasionally appears to carry on a conversational intercourse with his horse, and his attachment to the animal excites in return a corresponding affection. The horses of Barbary are in high reputation, for their speed and elegance of form, and in some parts of India and China there is a breed of horses scarcely larger than the mastiff-dog. In no country of the globe has the breed of horses been more attended to than in Great Britain, and the horses of this country are in so much estimation that, in periods of national tranquillity, they constitute an important article of exportation. The race of England is not excelled in swiftness or beauty by the coursers of Barbary or Arabia, and in supporting fatigue is much superior to either. The famous Bay Malton, which belonged formerly to the marquis of Rockingham, ran four miles in less than eight minutes; and the celebrated Childers, supposed to have been the fleetest horse ever known in the world, is said to have run a mile in very little more than a minute. See plate Nat. Hist. fig. 23.

The draught-horse constitutes another class of these animals, and is no where to be met with in higher perfection than in Great Britain. Yorkshire and Lincolnshire are the most celebrated counties for the breed; a horse of this kind is represented in fig. 24. One of them was, a few years since, exhibited in London, no less than 20 hands high.

The ass, a species of this genus, is found in various parts of Africa in a state of nature, in which it is gregarious, and displays very considerable beauty: and even sprightliness. The ass is found in the highest state of perfection in warm countries: in India and Persia asses are said to be absolutely white: here they are much in use, as well for the purposes of speed, as for great labour.

This animal, though naturalized now in Great Britain, was unknown to the inhabitants of the island till the time of queen Elizabeth. Its services to the poor, and of course to the rich, are at the present period regarded as of almost indispensible importance. Its wants with regard to food are easily supplied, but in the choice of water it is extremely fastidious, drinking only of that which is perfectly pure and clear. It is one of the most patient and persevering animals, but sluggish and obstinate to those who know not how to manage it. It takes pains not to wet its feet, and will avoid water, if left to itself, by various turns and crossings. In some countries the flesh of the ass is eaten and considered as delicious food; and in this its milk is in high request by sickly persons, by whom that of the cow is reckoned too heavy. The sluggishness of the ass has frequently excited ludicrous feelings, and it is said of Crassus, that the only occasion on which he was ever known to laugh, was at an ass eating thistles. The habits of the ass, it has been observed, do not appear a more fertile subject of ridicule than those of that philosopher.

The mule is a hybrid animal between the horse and the ass, and is a most serviceable animal in mountainous countries, where it will carry the rider with the greatest safety, amidst the most dangerous tracts. The manner of the mule on particular occasions of steep and perilous descent deserves to be mentioned. Where the path, perhaps, is scarcely four feet wide, having on one side a perpendicular ascent, and on the other a vast abyss, and presenting declivities of two or three or four hundred yards, the mule will, on arriving at one of these, halt, and no effort of the rider can urge him forward. He appears alarmed at the contemplation of the danger; in a few moments, however, he places himself in a proper attitude for the business, and then glides down with astonishing rapidity, yet amidst all his speed, retains that degree of self government which enables him to follow, with the most perfect precision, all the windings of road, and to avoid every impediment to his progress and security.

The Zebra is larger than the ass, but far more elegant in its form. See fig. 25. It is either of milk white, or cream colour, or adorned on every part with stripes arranged in exquisite order, and attended with extreme brilliancy and beauty. The

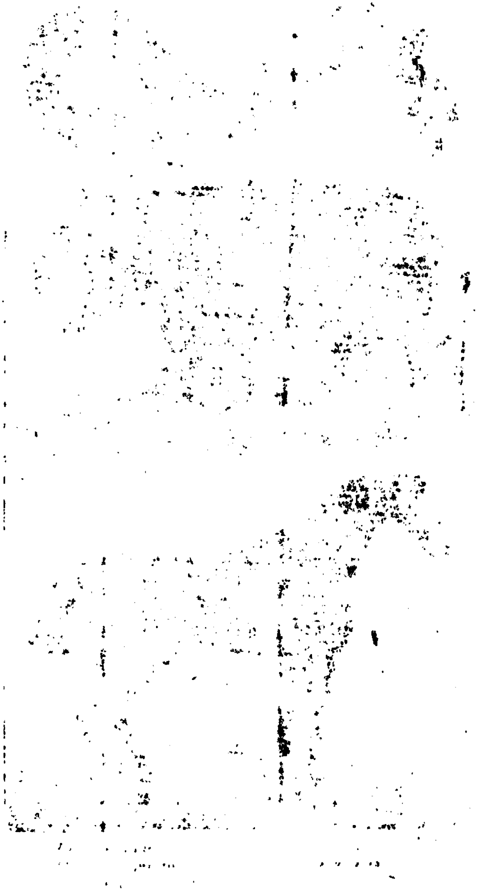


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Fig. 21. **Gymnotus** *electricus: Electrical gymnote.*
Fig. 22. **Hippopotamus** *amphibious River horse.*
Fig. 23. **Equus** *caballus: Race horse.*

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Zebra is found in Africa, from Ethiopia to the Cape, where it is so timid that it flies from the face of man with the utmost rapidity.

HORSE-GUARDS. See GUARD.

HOSEA, a canonical book of the Old Testament; and the first of the minor prophets. His prophecies are chiefly directed to the ten tribes before their captivity, threatening them with destruction in case of disobedience, but comforting the pious with the promise of the Messiah, and of the happy state of the church in the latter days. He is generally supposed to have prophesied from the year 785 to 725 before the Christian æra.

HOST, in church history, a contraction of *hostia*, a Latin word, signifying a victim, or sacrifice offered to the Deity. In a general sense, the term is used to Jesus Christ, as an *hostitia* offered to the Father for the sins of mankind. In the church of Rome, the *host* is the consecrated wafer used in the sacrament of the Eucharist; which wafer, or bread, being transubstantiated, as is taught, into the real body and blood of Christ, is in that rite offered up a sacrifice a-new.

HOUR, in chronology, an aliquot part of a *nycthemeron*. In Europe, an hour is the twenty-fourth part of the nycthemeron; and is subdivided into sixty minutes, or three hundred and sixty seconds. In France, indeed, the nycthemeron, according to the new system, is divided into twenty hours; the hour, into ten *decimal minutes*; and the minute into one hundred *decimal seconds*: making each hour to contain a thousand seconds. The most ancient hour is said to have consisted of the 12th part of the nycthemeron; that is, of two modern hours.

The hour of the Hindûs, is the sixtieth part of the nycthemeron; each hour containing twenty-four minutes, and each minute, twenty-four seconds, according to European computation. The division of the nycthemeron into twenty-four hours, was not known to the Romans before the first Punic war. Till that epoch, they divided the day and night into four hours each. The length of these hours depended upon that of the space during which the sun was above the horizon; for which reason, such hours are called unequal, or temporary. See DAY.

HOUR-*glass*, a popular kind of chronometer, serving to measure time by the descent or running of sand, water, &c. out of one glass vessel into another.

HOUSE *of Commons*. See COMMONS.

HOUSE *of Lords*. See PEERS.

HOWITZER, a kind of great gun or mortar, mounted on a carriage for travelling. See CARTOUCHE.

HOY, in naval architecture, a small vessel, chiefly used in coasting, or in carrying goods to or from a ship, in a road or bay, where the ordinary lighters cannot be managed with safety or convenience. In England, a hoy is usually rigged as a sloop; but it does not appear that the precise characteristics of this species of vessel are in any degree fixed.

HUDSON'S-BAY COMPANY, a trading company, established for conducting a commerce between Britain and the natives of that part of America which lies contiguous to the great bay, or Mediterranean Sea, which, from its discoverer, has been called Hudson's-bay. The articles obtained from this part of the world are chiefly furs, copper, and fish; and trunks of fir-trees, for masts.

Huer, a name given to certain fountains in Iceland of a most extraordinary nature, forming at times *jets d'eau* of scalding water of ninety feet in height and thirty in diameter, creating one of the most magnificent sights that can be conceived. The playing of these stupendous spouts is foretold by noises roaring like the cataract of Niagara. The largest is called Geyser; it is situated in a plain rising into small hills, in the midst of an amphitheatre bounded by the most magnificent and various shaped icy mountains, among which Hecla soars pre-eminent. Huers are not confined to the land: they rise in the very sea, and form scalding waters amidst the waves.

Huguenot, or hugonot, a French word, used in France, after the year 1560, as an appellation for a Protestant. Its origin, and of consequence its *literal* meaning, has received five or six different explanations. A massacre of the Huguenots took place on St. Bartholomew's-day, 1572. Henry IV, 1598, protected them by the edict of Nantz. Lewis XIV, 1685, revoked this edict, in consequence of which fifty thousand persons left France.

Hulk, in naval architecture, the body of a vessel, or that part which is, in truth, the vessel itself; the masts, sails, and cordage, composing only the apparatus for its navigation. Hulk is also an old ship; so called because such ship being no longer intended for navigation, the masts are taken away. Such old vessels are employed in the business of raising sand or ballast; and the criminals that are condemned to this work in the way of punishment, are said to be condemned *to the hulks.*

Hull, a contraction of *hulk.* The word is used, however, in a different sense. It means the body or hulk of a ship; but does not imply that she is without masts.

Humane society, in London, a charitable institution, the establishment of which is to be attributed to Dr. Hawes. Its objects are, to discover and supply the means of recovering persons from a state of suspended animation. We have, under article Drowning, as a more convenient place, given the methods adopted by this society for restoring to animation persons apparently drowned. See Suspended animation, *means of restoring.*

Humanities, a denomination which, in some universities, is given to the *belles-lettres*, or polite literature. The *professors of humanities*, in the universities of Scotland, are called *humanists.*

Humility is a virtue consisting in the moderate value which a person puts upon himself, and every thing relating to him. Or it consists in not attributing to ourselves any excellence or good which we have not; in not over-rating any thing which we have or do; in not taking an immoderate delight in one's self; in not assuming more of the praise of a quality or action than belongs to us; and in a lowly sense and acknowledgment of imperfections, and errors.

Hundred, a division of a *shire*, see Shire.

Hunger, a sensation in the stomach caused by the irritation of the gastric juice, inducing a desire for food.

Hurlers, a number of large oblong stones, set in a kind of square figure near St. Clare in Cornwall, so called from an odd opinion held by the common people, that, they are so many men petrified or changed into stones, for profaning the Sabbath by hurling ball, an exercise for which the people of that county have been always famous.

Hurricanes, a violent storm, such as is often experienced in the western hemisphere. Hurricanes are frequent in the West Indies, where they make terrible ravages, by rooting up trees, destroying houses and shipping, and the like. The natives, it is said, can foretell hurricanes by the following prognostics: 1. All hurricanes happen either on the day of the full, change, or quarter of the moon. 2. From the unusual redness of the sun, the great stillness, and at the same time, turbulence of the skies, swelling of the sea, and the like, happening at the change of the moon, they conclude there will be a hurricane next full moon; and if the same signs be observed on the full moon, they may expect one next new moon. As to the cause of hurricanes, they undoubtedly arise from the violent struggle of two opposite winds. Now as the wind between the tropics is generally easterly, and upon the sun's going back from the northern tropic the western winds pour down with violence upon those parts, the opposition of these contrary winds cannot fail to produce a hurricane. Hurricanes shift not through all the points of the compass, but begin always with a north wind, veer to the east and then cease; and their shifting between these two points is so sudden and violent, that it is impossible for any ship to veer with it: whence it happens that the sails are carried away, yards and all, and sometimes the masts themselves wreathed round like an osier.

Husbandry, the business of cultivating the earth, and rearing animals. Husbandry is the proper term for that which is commonly called farming; and, accordingly, in law, a man of this profession is not to be styled a farmer, but a husbandman. The word farmer has a more general sense. Husbandry includes agriculture, breeding, grazing, dairying, and every other occupation by which riches may be drawn from the superficial products of the earth. Husbandry may also be considered as the science, of which agriculture and the rest are the parts of practice. It was perhaps, the author of Telemachus that first retrieved, in the eyes of Europe, that reputation for importance to which husbandry has so just a claim. From his age, it has been progressively rising in estimation; and the present beholds, not only the children of feodal chieftains seeking honourable renown in that pursuit which was once abandoned to the meanest of their fathers' vassals, but, with a spirit that, to the disgrace of later times, must be called antique, the state and the plough guided by the same hands.

While the patriotism, however, of the great is thus laudably directed, there are not wanting those who call in question the utility of their exertions, and even attribute to them a diminution of the quantity, or, what is tantamount, an increase of the cost, of the products of the earth.

The question lies in a small compass: it includes only one point, namely, whether these exertions *have* diminished the quantity of the products of the earth? for, if they have not done this, the rest must be the work of other causes.

Now, will any man say, that a given number of acres in tilth, yields less grain under the new husbandry than under the old, or, in pasture, feeds fewer animals? The reverse is certainly true; and if the several products are greater than they were before or even equal, it will necessarily follow, that the increase of cost must result from circumstances wholly unconnected with the improvements, or the experiments, in husbandry.

The circumstances, probably, from which the rise in the value of provisions proceeds, and which the exertions in question actually *tend* to counteract, are these: the growth of population; the growth of commerce; and the growth of wealth, and consequent falling off of the relative worth of money.

If we will pursue commerce, we must not be such children as to suppose, that this, of all human concerns, can be without its evils. Instead of saying, that the improvements raise the price of provisions, we ought to inquire how far such well-aimed, though inadequate, efforts, have, on the contrary, moderated that rise? The fair question is, what *would* have been the prices, other things the same, had not these improvements taken place?

What are the objects of improvements in agriculture? The lessening the quantity of labour, by means of implements, machines, and methodical arrangements; and the ascertaining the principles of vegetation, and of the operation of manures. Now, can it be supposed that the reduction of expense in wages, and the cultivation of plants, and use of manures, less at random than formerly, have any tendency to multiply the price of the products?

What are the objects of improvements in breeding? The rearing such animals as, from their conformation, contain the greatest proportion of meat within a given weight of carcase; and such as, from the economy of their organs, will acquire the greatest quantity of flesh within a given time, and from a given quantity of pasture. Now, it is a fact, that by resorting to the improved breeds, instead of the common, a greater weight of meat may be obtained from a smaller consumption of grass; and need any other be cited, to justify a preference, and prove that, that preference tends to enlarge the supply, and, of consequence, to reduce the price, of the market? A mistake seems to be prevalent, with respect to the utility of raising such animals as the emulation excited by prizes has brought forward. The truth is, it is not intended that the markets should be filled with only such as these; but, if, in a given time, and upon fixed principles, such can be produced, then, upon the same principles, and in proportionate spaces of time, other animals, not so large, but equally profitable, may also be produced. In a word, the whole subject of controversy might be said to be, whether, in agriculture, it is better to have principles of conduct, or to proceed at hazard.

Improvements always meet with opposition from those who are attached to former methods; and it is desirable that, by this struggle, they should be separated from innovations: so far, the argument is rational; but when it is taken upon foreign grounds, when that which is merely a matter for examination among professional men, or those who make husbandry their study, is dragged into public disputation, and made to account for the concerns of trade, it ought to be considered as wholly nugatory. The only hypothesis upon which the new husbandry can be implicated in the rise of the markets, has been stated; and if this is not supportable, it will probably suggest itself to the mind of the reader, that the appearance of the several occurrences at the same time, is the only reason that a relationship is imputed.

"New husbandry" is chiefly distinguished from the "old," 1. by the use of new implements; 2. by drilling corn and seeds, instead of sowing in the broadcast manner, that is, scattering them with the hand; 3. by substituting a rotation of crops to the use of fallows; 4. by the use of lime and marl as manures; and, 5. by rearing a larger number of animals, by means of which, a farm is made to produce, in a great degree, its own manure. Jethro Tull was the father of the new husbandry.

Hussars, the national cavalry of Hungary and Croatia. Their regimentals consist of a rough, furred cap, adorned with a cock's feather; a doublet, with breeches, to which the stockings are fastened: and red, or yellow, boots; with the occasional addition of a short upper waistcoat, edged with fur, and having five rows of small, round metal buttons; and, in bad weather, a cloke. Their arms, are a sabre, a carabine, and pistols. The officers wear either an eagle's, or an heron's feather.

Hustings, (from the Saxon word, *hustinge*, a council, or court,) a court held in the guildhalls of several English cities, as London, Westminster, Winchester, and York, by the principal officers of their respective corporations. Here, deeds may be inrolled, outlawries sued out, and replevins, and writs of error, determined. Here, also, the elections of officers, and parliamentary representatives, take place.

HUTCHINSONIANS, the defenders of the philosophy of John Hutchinson, who was born in the year 1674. Hutchinson disapproved of Woodward's theory of the earth, and of Newton's doctrine of gravity. In opposition to these, he published that system of physics, which he conceived the Bible to inculcate, and which he denominated *Moses's Principia.*

HYACINTH, in natural history, a genus of transparent gems, of a red colour, with an intermixture of yellow. The hyacinth is of various sizes, from that of a pin's head, to the third of an inch in diameter. It is found in the East and West Indies, and in Bohemia and Silesia.

HYDATIDS, a singular tribe of animals of the genus tænia, belonging to the class and order of intestinal worms. They derive their name from the circumstance of their being formed like a bladder, and distended with an aqueous fluid. They have been traced in mammalia, serpents and fishes, but chiefly in the first of these classes, and more particularly in the liver of man, and in the liver and brains of sheep, than in any other animal tribe or organs. Dr. Baillie says they are found in the kidneys as well as the liver of man. They are said to enclose each other like nests of pill-boxes in the liver.

HYDRA, the polype, a genus of the class vermes,

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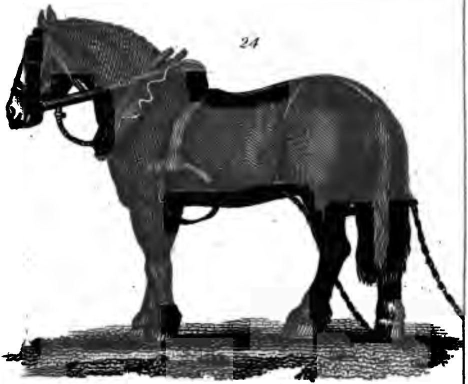

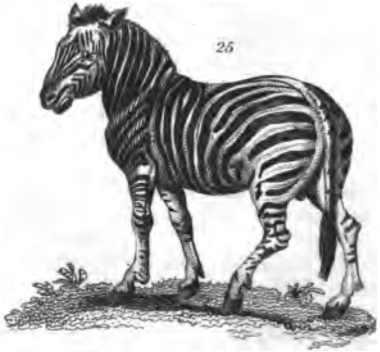

Cooper Sculp.

Fig. 24. Cart Horse.
Fig. 25. E. Zebra: Zebra.

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and order zoophyta: the animal fixes itself by the base, is linear, gelatinous, naked and contractile. It inhabits fresh waters. There are five species, three of which are found in this country: of these, the principal is Hydra viridis, having about ten tentacles shorter than the body. It inhabits stagnant waters, and is found on the surface of plants, and appears at first sight like a little transparent green jelly. This is the appearance in the quiescent state, but when expanded, it is a linear body, fixed at one end, and surrounded at the other by tentacles or arms placed in a circle round the mouth, and generally producing its young from the sides. These, at first, seem small papillæ, increasing in length, till they assume the form of the parent, and then dropping off. The whole tribe has a most wonderful faculty of re-producing parts which have been destroyed, and if cut or divided in any direction, each separate part becomes a perfect polype, as slips of certain plants become the same plants in perfect form. See pl. Nat. Hist. fig. 26.

Hydrargyrum, a name given to quicksilver, or mercury, on account of its liquid state. See Mercury.

Hydraulics, that branch of hydrostatics which teaches to estimate the velocity of moving unelastic fluids. It is this important science, that furnishes the principles upon which the engines are constructed, by which water is raised. Without it, water could not be laid into those dwellings, the bases of which are above the surface of rivers; nor could any be supplied to extinguish accidental fires. To these, are to be added, pumps, steam-engines, fountains, and a variety of useful contrivances, all, more or less, dependent on hydraulics.

The foundation of hydraulics, is that principle of fluids, which distinguishes them so remarkably from solid bodies, and which is, that, if led in pipes, they will always rise to the level, or nearly so, of the reservoir whence they are supplied. This, in works simply hydraulic, is all; but in those both hydraulic and pneumatic, the force of air is added, to increase the natural velocity of water, and raise it to extraordinary heights.

Machines, of both these descriptions, are in such daily and ordinary use, that their nature, and consequently the general outlines of hydraulics, will be easily explained. The first comprehend those by which water is brought into the upper stories even of houses, and by which artificial fountains are made to rise. Here, nothing more is necessary than to have a reservoir, the surface of which is somewhat above the level to which the stream is desired to ascend. The surface of the reservoir is to be somewhat above that level, because of the resistance of the air at the opening, for which it is necessary to allow a small deduction.

When jets are executed in the best manner, the resistance of the air only will cause them to fall short of the height of their reservoirs, in the following proportions:

Jet.	Reser.		Jet.	Reser.	
Feet.	Feet.	Inches.	Feet.	Feet.	Inches.
5	5	1	55	65	1
10	10	4	65	79	1
15	15	9	75	93	9
25	27	1	85	109	1
35	39	1	95	125	1
45	51	9	100	133	4

From these facts, it is determined, that as often as a five-foot jet shall be contained in the height of any jet proposed, by so many inches, multiplied into themselves, or squared, the surface of the water in the reservoir which supplies it, ought to exceed that jet in height.

If, however, there be not a natural reservoir of the necessary height, such a one must be formed, and the water raised into it, artificially, and here it is that engines, both hydraulic and pneumatic, are required, so that, by the assistance of air, the water may be forced upward. Thus the water which, from the Thames, and the New-river, supplies the inhabitants of London, is first raised into reservoirs, the surfaces of which exceed the extreme height of the pipes they supply; and, this being done, the rest follows upon the simple principles already described. The common pump and water engines are both hydraulic and pneumatic.

The steam-engine is a compound piece of machinery, frequently applied to hydraulic purposes, but not absolutely in itself hydraulic. Its action is produced by the power of vapour, or steam, rising from boiling water; in the same manner that the action of a smoke-jack is produced by that of vapour or smoke, rising from coals. The power of vapour is immense: one hundred and forty pounds of gunpowder will blow up a weight of thirty thousand-pounds; but the same weight of water, converted into vapour, will lift up a weight of upward of seventy-seven thousand pounds.

The steam-engine is employed to work various kinds of machinery, in all of which, the specific operation it performs, is that of lifting. See PUMP, STEAM-*engine*, &c.

Hydrogen. Hydrogen is one of the constituents of water; fifteen parts of hydrogen, and eighty five of oxygen form this fluid. It is never found but in a state of combination. It approaches nearest to purity when combined with caloric, and in the form of gas. Whatever process decomposes water, will produce hydrogen gas, provided the oxygen of the water be absorbed by any other substance, as is seen in the following experiments. If water be dropped gradually through a gun barrel, or iron pipe, made red hot in the middle, the water will be decomposed; the oxygen will form an oxyde or rust with the iron, and the hydrogen gas will come out pure from the opposite end.

Plunge a red-hot iron into water, the hydrogen gas rises with the vapour, and is known by its peculiar smell. Hydrogen gas is twelve times lighter than common air, hence it has been applied to the filling of balloons. It is highly inflammable under certain circumstances, hence it was formerly known by the name of *inflammable air*. It is incapable of supporting flame or combustion of itself. It burns only in consequence of its strong attraction for oxygen.

Hydrogen also forms one of the constituents of coal, from which it may be extracted in the form of gas. Hence it has been used for lighting up streets and houses by what is called gas lights.

Ex. 1. To procure hydrogen gas, provide a phial with a cork stopper, through which is thrust a piece of tobacco pipe. Into the phial put a few pieces of zinc, or small iron nails: on this pour a mixture of equal parts of sulphuric acid, (oil of vitriol) and water previously slowly mixed in a tea cup to prevent accidents. Replace the cork stopper with the piece of tobacco pipe in it. The hydrogen gas will then be liberated through the pipe in a small stream. Apply the flame of a candle or taper to this stream, and it will immediately take fire and burn with a clear flame until all the hydrogen in the phial be exhausted. In this experiment, the zinc or iron, by the action of the acid becomes oxigenised and is dissolved, thus taking the oxygen from the sulphuric acid and water. The hydrogen, the other constituent part of the water, is thus liberated and ascends.

2. Apply a bladder (previously wetted and compressed in order to squeeze out all the common air) to the piece of tobacco pipe inserted in the cork stopper of the phial. The bladder will thus be filled with hydrogen gas.

3. Adapt the end of a common tobacco pipe to the bladder thus filled with hydrogen gas, and dip the bowl of the pipe into soapsuds, prepared as if for blowing up soap bubbles. Squeeze out small portions of gas from the bladder into these soapsuds, and the bubbles formed will ascend into the air with very great rapidity, until they are out of sight.

4. If a lighted taper or candle is applied to the bubbles as they ascend from the bowl of a tobacco pipe, they will explode or burst with a loud noise. By the application of the flame of the candle in this experiment, the hydrogen in the soap bubble is burnt or decomposed, and forms water by uniting with the oxygen of the atmosphere. The noise made by the explosion, is occasioned by the

atmospheric air suddenly rushing in, or collapsing upon the empty space left by the bursting or exploding of the gas bubble.

5. In order to produce an imitation of the gas lights, pound a small quantity of coal into a powder, and put it into the bowl of a tobacco pipe. Cover the coal closely over with clay, and put the bowl of the pipe into the fire. In a few minutes a stream of hydrogen gas will issue from the end of the tobacco pipe, which may be set fire to with a candle or piece of lighted paper, in the usual way.

1. In this experiment the volatile parts of the coal are rarefied and driven off through the tobacco pipe; and hydrogen being one of the constituent parts of coal, passes off in the gaseous form. In this state it holds in solution some of the substance called carbon. Hence it has been sometimes called carburetted hydrogen gas.

2. In the production of gas lights on a larger scale, the coal is put into an iron cauldron, and heat applied to it, when the gas ascends, and is distributed by means of metal pipes into the various apartments of a house, or through the streets of a town.

In experiments upon the combustion of hydrogen gas, a dangerous explosion takes place if care be not taken to keep the gas entirely free from any mixture of common air.

Ex. Into a bladder half full of atmospheric air, introduce hydrogen gas in the way already described, until the bladder is full. With this mixture of gas and atmospheric air, fill a wide mouthed phial. On applying flame to the mouth of the phial, the contents will explode with a loud report, and break the phial if it be not very strong, or guarded by a cloth wrapped round it. Some employ a copper phial in this experiment.

Hydrogen gas, besides being combined with water, may also be combined with sulphur, phosphorus, and carbon. It is then called sulphuretted hydrogen, phosphuretted hydrogen, and carburetted hydrogen. Sulphuretted hydrogen gas forms part of the fetid effluvia which rises from house-drains, and is produced by the decomposition of animal and vegetable substances, containing sulphur and hydrogen. Phosphuretted hydrogen gas has a fetid putrid smell, and takes fire whenever it comes in contact with the atmospheric air.

Ex. 1. To procure phosphuretted hydrogen gas, put a small quantity of phosphorus, and some potass dissolved in water, into a retort. Apply the flame of a candle or lamp to the bottom of the retort, until the contents boil. The phosphuretted hydrogen gas will then rise and may be collected in receivers.

2. Instead of receiving the gas into a jar, let it simply ascend into the water of the tub. The bubbles of gas will then explode in succession as they reach the surface of the water, and a beautiful cloud of white smoke will be formed, which rises slowly and majestically to the ceiling.

3. If bits of phosphorus are kept some hours in hydrogen gas, *phosphurized hydrogen gas* is produced, which has the smell of garlic. If bubbles of this gas are thrown up into a receiver, previously filled with oxygen gas, a brilliant bluish flame will immediately fill the jar. It is this gas which is

seen on the surface of burial grounds and swamps at night, and is known by the name of will-o'-the-wisp. This gas is also emitted from fish, which gives them a shining appearance in the dark.

Carburetted hydrogen gas is that which is produced from the distillation of coal, and is used for gas lights.

Hydrography, in cosmography, the description of the *water*, or ocean, seas, rivers, &c. as *geography* is the description of the *earth*, or land.

Hydrometer, an instrument used to measure whatever is desired to be known respecting fluids; as their gravity, density, and velocity. The hydrometer is the instrument by which the officers of the revenue ascertain the strength of spirituous liquors. It consists of a small hollow globe of glass or metal, with a stem, or scale, which being graduated, marks the depth to which the ball sinks. Being calculated upon the specific gravity of water, if the hydrometer is put into a fluid lighter than that, it will sink proportionably, and, if in a heavier, be buoyed up. See Pl. Hydrostatics, Fig. 7.

Hydroscope, an instrument antiently used for the mensuration of time. The hydroscope was a kind of water-clock, consisting of a cylindrical tube, conical at the bottom: the cylinder was graduated, or marked with divisions; and as the surface of the water, which trickled out at the point of the cone, successively sunk to these several divisions, it pointed out the hour.

Hydrostatics, the science which treats of the weight, of the nature and properties of fluids; and which teaches the arts of assaying metals, of ascertaining the strength of spirituous liquors, of determining the specific gravities of bodies in general, the principles upon which water may be raised, and all hydraulic engines constructed. This science treats more especially of the mechanical properties of non-elastic fluids, particularly of water. Fluids are subject to the same laws of gravity with solids, but the want of cohesion of their parts occasions some peculiarities. The parts of a solid are so connected as to form a whole, and their effort is concentrated into a single point called the centre of gravity, but the several parts of a fluid gravitate independently of each other, and hence it is that the surface of a fluid contained in an open vessel is always level. Fluids have this remarkable property, that they press not only in common with solids perpendicularly, but also upwards, sideways, and in every direction equally.

Ex. 1. Take a glass tube open at both ends, put a cork in one end, and immerse the other in water. The fluid will not rise far in the tube, but the moment the cork is taken out it will rise to a level with the surrounding water.

2. If a vessel, Plate Hydrostatics, Fig. 1, consists of pipes variously inclined, communicating with each other at the bottom B, and open at the top, water poured into any one of them will rise to the same level in all.

The pressure of the same fluid is in proportion to the perpendicular height, and is exerted in every direction, so that all the parts, at the same depth, press each other with equal force in every direction.

3. An empty bottle being corked, and by means of a weight, let down a certain depth into the sea, it will be broken, or the cork will be driven into it

by the perpendicular pressure. But a bottle filled with water, wine, &c. may be let down to any depth without damage, because in this case the internal pressure is equal to the external. The horizontal bottom of a vessel sustains the pressure of a column of the fluid, the base of which is the bottom of the vessel, and the perpendicular height is equal to the depth of the fluid.

4. In the vessel A B, Fig. 2, the bottom C B does not sustain a pressure equal to the quantity of the whole fluid, but only of a column whose base is C B, and height C E.

5. In the vessel F G, Fig. 3, the bottom sustains a pressure equal to what it would be if the vessel were as wide at the top as at the bottom.

The pressure of a fluid upon any given part of the bottom or sides of a vessel is equal to the weight of a column of that fluid, having a base equal to that part of the bottom or side, and an altitude equal to the perpendicular height of the fluid above it. Hence may be calculated the pressure upon, and the strength required for dams, cisterns, pipes, &c. And thus we are led to what is called the hydrostatical paradox, which is of vast importance in this science: viz. That any quantity of fluid however small may be made to balance any other quantity however large.

6. If to the wide vessel A B, Fig. 4, a tube C D be attached, and water be poured into either of them, it will stand at the same height in both, consequently the small quantity in C D balances the large quantity in A B, and this would be the case if the part A B contained a hogshead; and the small tube only a pint or a gill.

The upper pressure of fluids is shewn by the hydrostatical bellows, which consists of two circular or oval boards, Fig. 5, covered with leather, to rise and fall like common bellows, but without valves. A pipe A B about 3 or 4 feet long is fixed to the under board. If a little water run into the bellows to separate the boards, then weights to the amount of two or three hundred pounds may be put on the upper board; after which, if the pipe be supplied with water, it will by the upper pressure raise the weights and sustain them.

The hydrostatic balance, used for finding the specific gravities of bodies, differs but little from the common balance, see Fig. 6, only it has a hook at the bottom of one of the scales, on which different substances that are to be examined may be hung by horse hairs, so as to be immersed in a vessel of water without wetting the scale. If, for instance, a body *x* suspended under the scale be first counterpoised in air by weights in the opposite scale, and then immersed in water, the equilibrium will be destroyed; then if a weight be put into the scale from which the body hangs to restore the equilibrium, that weight will be equal to the weight of a portion of water as large as the immersed body. If *x* represent a guinea, then in air it weighs 129 grains, and by being immersed in water it loses $7\frac{1}{4}$ grains, which shews that a quantity of water equal, in bulk, to a guinea, weighs $7\frac{1}{4}$ grains, therefore according to the rule, given in the article GRAVITY *specific*, divide 129 by $7\frac{1}{4}$ or 516 by 29, and the quotient will be 17.793, which proves that the guinea is 17.793, or almost 18 times heavier than its bulk of water.

Hygrometer, an instrument for measuring the moisture of the atmosphere, as the *barometer* measures the weight. The plan upon which such an instrument is to be constructed, must be that of taking for a standard some substance which swells when the atmosphere is moist, and shrinks when it is dry. The *degrees* of this swelling or shrinking, will determine the degrees of moisture or dryness. The hygrometer has not yet been brought to the desired perfection. It has been constructed upon three principles: 1. The lengthening and shortening of strings, or their twisting and untwisting, by reason of moisture and dryness; 2. The swelling and shrinking of solid substances, from the same causes; and, 3. The increase or decrease of the weight of particular bodies, whose nature it is to absorb the humidity of the atmosphere.

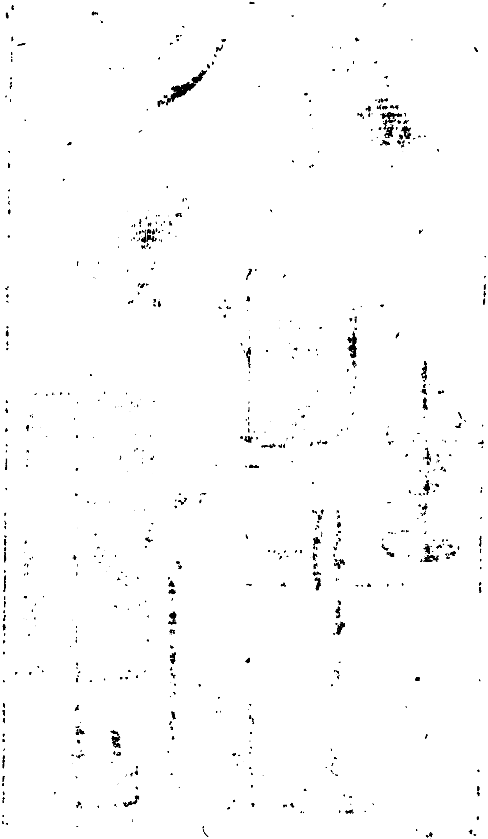
Hygroscope, the same with hygrometer. In all names of instruments to which, there are these two several terminations, as *thermometer* and *thermoscope*, the only difference is, that the first expresses something which *measures*, and the latter, which *shows*, or *exhibits to view*.

Hymenoptera, see Entymology.

Hyperbole, see Conic *Section*.

Hyperbole, in rhetoric, a figure which magnifies or diminishes in an excessive degree. The hyperbole is subject to this law, that the proper occasion for its appearance, is that in which an object is mentioned, which in itself exceeds, or falls below, the common measure.

Hyphen (-), in grammar, implying that two words are to be joined together, or compounded; as *post-horse, court-yard.* Hyphens are also used, to con-



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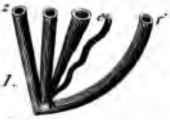
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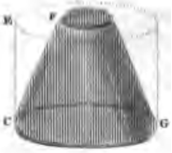
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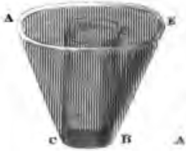
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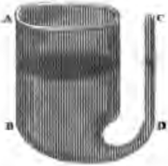
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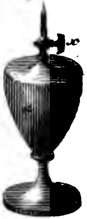
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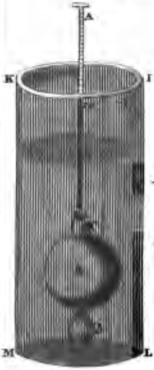
Fig.7.

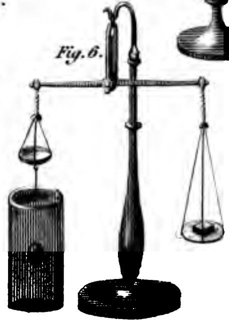
Fig.6.

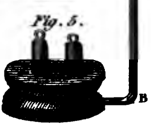
Fig.5.

Cooper sculp.

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nect the syllables of words which are divided at the terminations of lines.

Hyrax, a genus of Mammalia of the order Glires, of which there are only two species, viz. the hyrax Capensis, or Cape-hyrax, and the hyrax Syriacus, or bristly hyrax, to be met with in Ethiopia and Abyssinia, particularly under the rocks of the mountains of the sun. The animals of this genus are gregarious, and may be seen in companies of several scores together before the clefts of the rocks, basking in the open sunshine. They live on grain, fruits, and roots, and when kept in confinement will live upon bread and milk. See pl. Nat. Hist. Fig. 27.

Hystrix, porcupine, a genus of animals of the class Mammalia; and of the order Glires. There are five species, of which the Hystrix cristata or common porcupine may be noticed. It is found in Africa, India, and the warm climates of Europe. The upper part of its body is covered with variegated spines or quills, which are long and sharp, and which, when the animal is irritated, it has the power of darting out against an adversary. Its principal food consists of the bark of trees, roots and various kinds of fruit, which it collects in the night. In the day it lies retired, sleeping in a subterraneous habitation, which it is said to construct with particular ingenuity, dividing it into several apartments. See pl. Nat. Hist. Fig. 28.

I.

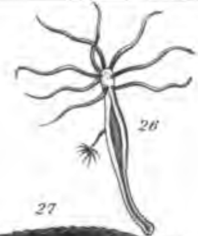
I or i, the ninth letter in the alphabet, and the third vowel. Its sound varies; in some words it is long, as *high*, *mind*: in some it is short, as *bid*, *kid*, and in others it is pronounced like *y*, as *collier*, *onion*, &c. in a few words its sound approaches to the double *e e*, as in *machine*. I, used as a numeral, signifies no more than one, and it stands for as many units as it is repeated times, thus II, III stands for 2 and 3. When put before a higher numeral it subtracts itself, as IV, four, and when set after it, the effect is addition, XII, twelve. See ARITHMETIC.

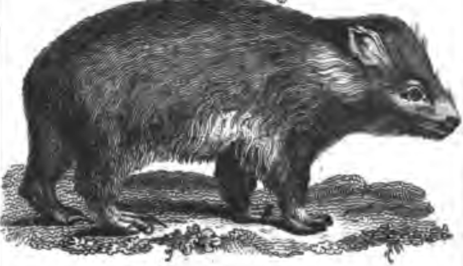
IACINTH, see HYACINTH.

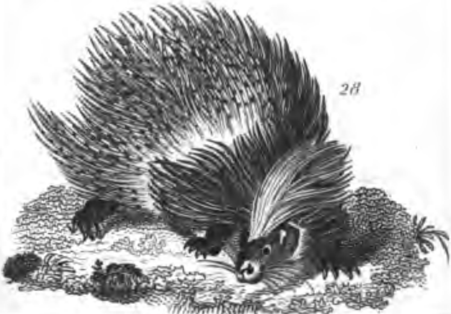
ICE, water in a solid state. When water is exposed to a temperature below 32° of Fahrenheit, (see THERMOMETER,) it assumes a solid state by shooting into crystals, which cross each other in angles of 60 degrees. Ice is always found at the same temperature or 32°; it is lighter than water, of course its bulk is larger than that of water of which it is formed, and this increase of dimensions is acquired with prodigious force, sufficient to burst the strongest vessels. There is a grotto in France, about seven leagues from Besançon, distinguished from all others by a very singular pheonomenon: in summer, ice is constantly formed in it, in large quantities, and this ice diminishes at the approach of winter. The rock forming the roof of this cavern is lower than the neighbouring plains, and the grotto itself is covered with bushy trees, from the

[illegible]

[illegible] following [illegible] spring [illegible]







Cooper sculp.

Fig. 26. **Hydra** *viridis*: *Polype.*
Fig. 27. **Hyrax** *Capensis*: *Cape Hyrax.*
Fig. 28. **Hystrix** *cristata*: *Crested Hystrix.*

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leaves of which, evaporation is constantly going on. In consequence of this evaporation, the ground is so far cooled in the summer as to occasion freezing in the cavern, in the same manner as water in porous jars is cooled in hot countries, by evaporation from the outsides: when by the fall of the leaves, evaporation is checked, the temperature of the cavern rises, and the quantity of ice is diminished.

ICE-BERGS, large bodies of ice, filling the valleys between high mountains, in northern latitudes; among the most remarkable are those on the coast of Spitzbergen. Their appearance is in many respects like that of the glaciers in Switzerland. They are the gradual creation of ages, and receive annually additional height by the falling of snows and of rain, which more than repairs the loss occasioned by the influence of the melting sun.

ICH-DIEN, the motto of the Prince of Wales's arms, signifying in the High Dutch, I serve. It was first used by Edward the Black Prince, to shew his subjection to his father, king Edward III.

ICHNEUMON, a genus of insects of the Hymenoptera order. There are said to be 500 species included in this genus, separated into families. The whole genus has been denominated parasitical, on account of the very extraordinary manner in which they provide for the future support of their offspring. The fly feeds on the honey of flowers, and when about to lay eggs, perforates the body of some other insects, or its larvæ, with its sting or instrument at the end of the abdomen, and there deposits them. These eggs, in a few days, are hatched, and the young nourish themselves with the juices of their foster-parent, which, however, continues to move about and feed till near the time of its change to a chrysalis, when the larvæ of the ichneumon creep out by perforating the skin in various places, and each spinning itself up in a small oval silken case, changes into a chrysalis, and after a certain period they emerge in the state of complete ichneumons. The caterpillar of the common white cabbage butterfly may be given as an example.

ICOSAHEDRON, see BODY.

ICOSANDRIA, see BOTANY. The icosandria class furnishes the pulpy fruits that are mostly esteemed, such as apples, plumbs, peaches, cherries, &c. whereas the polyandria are mostly poisonous, as the aconite, columbine, larkspur, hellebore, and others.

ICHTHYOLOGY, in zoölogy, a system of natural history of fishes. In the Linnæan system of zoölogy, fishes compose the fourth class, and are distributed into four orders, distinguished by the conformation, or want, of fins.

Orders.	*Examples.*	*Orders.*	*Examples.*
1. *Apodes.*	Eel.	3. *Thoracici.*	Perch.
2. *Jugulares.*	Cod.	4. *Abdominales.*	Salmon.

From this arrangement, the whale, dolphin, &c. are omitted; these being comprehended in the class of *mammalia*.

To these are to be added the Cartilaginous fish, which were separated into two orders, viz. the branchiostegeous or fishes that have gills without bony rays; and the chondropterigious or those that have cartilaginous gills: the *sucker* belongs to the former, and the squalus or shark to the latter.

Pennant has given another system. This naturalist makes three divisions, each of which comprehends several genera:

Divisions.	*Examples.*
Cetaceous.	Whale.
Cartilaginous.	Picked dog-fish.
Bony.	Cod.

That fishes swim by means of their tails, and preserve their equilibrium with their fins, is an observation generally known; but the power of raising and lowering themselves in the water has been supposed to be owing to the air-bladder, a membranous bag, filled with air, situated towards the back of the fish, and opening into the gullet. It has been proved in the instance of the carp, that if the air-bladder is ruptured, the fish can never after rise from the bottom of the water; but the general conclusion that might be drawn from this fact, is rendered eminently questionable, by the no less positive facts, that all the cartilaginous fishes, though they rise and sink with facility, are without the air-bladder: and that the eel, which has it, is scarcely able to leave the bottom.

The way in which the air-bladder is thought to enable the fish to lift and depress itself is this: by swelling, at the pleasure of the animal, it increases the surface of its body, and thus diminishes its specific gravity; by contracting, it increases it. See PISCES.

IDEA, in metaphysics, the first act of reasoning, or the combination of two or more perceptions.

IDES, in the ancient Roman kalendar, eight days in each month, the first of which, in March, May, July, and October, fell on the 15th of the month, and, in the other months, on the 13th.

Idiom, in grammar, is a term applied to such words, or combinations of words, as have a peculiar sense in any one language; but which, if transferred into another, would have no meaning, or a wholly different one. Idioms, then, can never be literally translated; and the merit of a translator, in this respect, consists in substituting the corresponding idiom of the language into which he is translating. Thus, in England, it is said to *get by heart*, meaning, *by memory*. This the Latins express by *mandare memoriæ*, to commit to memory, and *recitare memoria*, to recite by memory.

Ignition, is that emission of light produced in bodies by exposing them to a high temperature, and which is not accompanied by any other chemical change in them. It may be distinguished from combustion, a process in which there is also the emission of light and heat. Combustion is the result of the chemical action of the air, or of a principle which the air contains, hence combustible bodies are alone susceptible of it, and when the process has ceased, the body is no longer combustible. Ignition is an effect of the operation of caloric alone, wholly independent of the air.

Ilex, the holly, in botany, of which there are 16 species. The Ilex aoquifolium, or common holly, is usually from 20 to 30 feet in height, though it sometimes grows to double that size. Mr. Millar discovered the difference of sexes in the flowers of the common holly. The wood of this tree is the whitest of all hard woods, and used for inlaying, especially with ivory. The millwright, turner, and engraver prefer it to any other. It is used with box, yew, and white thorn, in the small trinkets and other works carried on about Tunbridge, commonly called Tunbridge-ware. Birds eat the berries of the holly, and the bark, fermented, and cleared of the woody fibres, makes the common bird-lime.

Illicium, a genus of plants, consisting of two species, viz. the illicium anisatum: and illicium floridanum. The whole of the first mentioned plant, especially the fruit, has a pleasant aromatic smell, and a sweetish acrid taste. It is used for seasoning dishes, and in Japan they place bundles and garlands of the aniseed tree in their temples before the idols. The bark, finely powdered, is used by the public watchmen to make chronometers for measuring the time, by slowly sparkling at certain spaces in the box, in order to direct them when the public bells are to sound.

Illuminants, Illuminati, in modern history, a denomination by which, at different periods, several sects of religion and philosophy, in Europe, have been known. If a comprehensive view of the state of moral philosophy, at this moment, be taken, it will be found that one great controversy divides all the writers of this part of the world. The question is, whether the powers of the human mind, and the condition of human society, be capable of improvement? These philosophers of the continent, who contend for the affirmative of this question, affect the name of *aukflarer*, illuminants, or enlighteners; while on their adversaries, they bestow the name, *finsterlinge*, obscurants, or, bedarkeners; and represent them as, if not actual jesuits, still pursuing the jesuitical plan. It is scarcely necessary to remark, that the philosophy of the *illuminants* leads them to propose innovations, and to struggle incessantly for the diffusion of science; while that of their opposers induces to labour at maintaining the present order of things. The revolution in France has been attributed to *illuminism* or *jacobinism*; but, apparently, with want of consideration. It was the state of its finances that brought on the destruction of the old government: when that was accomplished, then, indeed, jacobinism struggled for the ascendancy.

Illuminating, a kind of miniature painting, formerly practised for illustrating and adorning books. The writers of books first finished their part, and the illuminators embellished them with ornamented letters and paintings.

Image, in optics, is the appearance of an object made either by reflection or refraction. In *plain* mirrors, the image is of the same magnitude as the object, and appears as far behind the mirror as the object is before it. In *convex* mirrors, the image is less than the object, and farther distant from the centre of the convexity, than from the point of reflexion. See Optics.

Imagination, in metaphysics, that action of the mind by which it combines ideas, and "bodies forth the forms and images of things."

Immersion, in astronomy, is when a star or planet is so near the sun with regard to our observations, that we cannot see it, being as it were hidden in the rays of that luminary. It also denotes the beginning of an eclipse of the moon, and of the satellites of Jupiter. The eclipses of the first satellite of Jupiter are much used for discovering the longitude. The immersion of that satellite is the moment in which it appears to enter the disc of Jupiter, and its emersion the moment when it appears to come out.

Impatiens, a genus of plants, of which there are twelve species. The impatiens noli tangere, common yellow balsam, is an annual plant; during the day the leaves are expanded, but at night they hang pendant, contrary to what is observed in most plants, which from a deficiency of moisture, or a too great perspiration from heat, commonly droop their leaves in the day-time. When the seeds are ripe, upon touching the capsule, they are thrown out with considerable force, hence its name.

Imports, in commerce, goods brought into a nation, in contradistinction to *exports*. The following is a view of the exports and imports of Great Britain, during the year ending January 5, 1798, given by Mr. Colquhoun:

Specification of the different Trades.	No. of Ships.		Tons including their repeated Voyages.	Estimate of the number of Packages out & home	Total Value of Imports and Exports.
	Foreign.	British			£.
East-Indies	3	50	41,466	300,000	10,502,000
West-Indies	11	335	101,484	400,000	11,013,000
American Colonies	0	68	13,986	65,000	1,638,000
Africa	9	17	4,336	20,000	531,000
Fisheries	0	45	12,230	20,000	314,000
United States of America	140	0	32,213	260,000	5,416,000
Mediterran. and Turkey	29	43	14,757	70,000	509,000
Spain; and the Canaries	149	2	16,509	60,000	947,000
France; & Netherlands	121	1	10,677	20,000	1,015,000
Portugal and Madeira	55	125	27,670	50,000	853,000
Holland	389	0	19,166	60,000	2,211,000
Germany	172	63	37,647	240,000	10,672,000
Prussia	527	61	56,954	60,000	432,000
Poland	31	38	17,240	70,000	242,000
Sweden	200	9	[illegible]	50,000	323,000
Denmark	194	8	48,469	60,000	806,000
Russia	5	225	56,131	150,000	2,917,000
Guern. Jer. Ald. & Man	4	42	5,344	15,000	302,000
Ireland	3	273	[illegible]	160,000	2,539,000
Coasting Trade	0	6,600	560,000	900,000	6,600,000
Coal Trade	0	3,676	656,000		1,710,000
	1843	11,601	[illegible]	3,030,000	[illegible]

The total value of the imports to England in the year 1354, was under 39 thousand pounds; but in the year 1800, it amounted to more than 30 millions of pounds sterling. From that time to the last year, it varied each year, from 28 to 38 millions. It must be observed that these are the official values, which are very different from the real value; thus the official value of the imports for 1807, is 29,556,330*l.*; but the real value was upwards of 58 millions.

Incidence, denotes the direction in which one body strikes on another. See **Mechanics** and **Optics**. It is demonstrated that the angle of incidence is equal to the angle of reflection, and that they both lie in the same plane.

Inclined *plane*. See **Mechanics**.

Independents, a sect of Protestant Christians, distinguished, not by doctrine, but discipline. They regard every congregation of Christians, meeting in one building for the purpose of public worship, as a complete church, *independent* on any other religious government; they reject the use of all creeds, as impious substitutes for the letter of the *Scripture*; and they hold that the rite of ordination does not confer any apostolic virtue upon the receiver. Their ministers, therefore, only undergo an examination, before they are permitted to speak in public. The direction of each *church* is vested in its *elders*. The Independents arose during that period of religious disquiet, at which the church of England was established. They thought the reformation not sufficiently complete. Robert Brown was their first leader, from whom they were denominated *Brownists*; but this man, whose violence of conduct, and rigour of doctrine, was extreme, abandoned his party, which had followed him into the Low Countries, and returning to England, took orders in the established church, and obtained a benefice. On this defection, John Robinson, a man of more moderation, undertook to new model the society, in behalf of which he published an *apology*. After this, the adherents of the cause, were called *Independents*; and Robinson became considered as their founder.

INDIA, or the East-Indies: under this head is comprehended all that tract of country which is situated south of Tartary, between Persia and China, as well as the islands in the eastern Indian sea. It was formerly considered in all geographical works under the divisions of India *beyond* the Ganges, and India *within* the Ganges. The country is now generally denominated Hindostan. Strictly speaking the name Hindostan should only be applied to the part that lies north of the 21st and 22nd degrees of latitude; the river Nerbudda being the southern extremity, as far as it goes; while Bengal and Bahar bound the south elsewhere. The country on the south side of this line is called by the general name of Deccan: this division is not now generally followed, and the term Hindostan is applied to the whole region, as well as to Hindostan proper. The country is extremely populous: it abounds in diamonds and other precious stones; and its chief manufactures are muslin, calico, and silk.

INDIA-RUBBER, CAOUTCHOUC, or ELASTIC-RESIN, a substance produced from the *syringa-tree* of Cayenne, and other parts of South America. It oozes in a milky form, from incisions made in the tree; and is chiefly gathered in time of rain, because it then flows in peculiar abundance. It is said to acquire the consistence in which it is seen in foreign countries, by mere exposure to the air. The Americans use it to make boots, which are impenetrable to water; and bottles, which they fasten to the ends of reeds. They also convert it into flambeaux, an inch and an half in diameter, and two feet long, which afford a brilliant light, and burn twelve hours. A kind of cloth is farther prepared from it, which supplies, to the inhabitants of Quito, the place of the oiled or tarred cloths of Europe. By means of moulds of clay, it is made into various useful and ornamental figures. This process is commenced by spreading it, while yet in a clammy state, over the moulds, in successive layers, till the desired thickness is attained. The figure is then exposed to the smoke of burning vegetables, which gives it a blackness of colour. Before it is perfectly hardened, it is also capable of receiving those impressions on the outer side, which are commonly seen.

Indian ink. See Ink.

Indictment, is a written accusation of one or more persons, of a crime or misdemeanor, preferred to, and presented on oath by a Grand Jury, which see.

Indigo, a drug, of a dark-blue colour, used in dyeing, and prepared from the leaves and small branches of a low shrub, indigenous in the warmer parts of Asia and Africa, and now cultivated in those of America. The indigo is cut when in flowers, the tips of the branches only being taken, and several cuttings been made during the season.

In bringing in the slips, care is taken not to lose more of the pollen, or farina-fecundans, than necessity compels; this part of the plant being peculiarly valuable. The slips are thrown into a steeping vat, or large tub, filled with water. There it undergoes a fermentation, which is completed in twenty-four hours. The water is then drawn into another tub, called the mortar, and the vat, being cleansed, is ready to receive a second supply of slips. The water that has run into the pounding-tub, is found impregnated with a subtile earth, which alone constitutes the substance, which is the object of the labour, and which must be separated from the salts of the plant, which are here useless. To effect this, the water is forcibly agitated with wooden buckets. These buckets are pierced full of holes, and fixed to a long handle. When it is perceived that the coloured particles collect together, by separating from the water, the agitation is discontinued, in order to allow them to precipitate to the bottom of the tub, where they are left to settle, till the water is quite clear. Vents in the tub, pierced at different heights, are then successively opened, to let out the water. The particles, with the water that remains, having acquired the consistence of a syrup, this thick liquid is afterward drawn off into a settler. The superfluous water is here more completely drained away, and still, subsequently, filtered through a sacking cloth. The indigo is then put into chests, where it is gradually freed from all moisture; and, at the end of three months, becomes fit for sale.

INERTIA, of *matter*, is that passive principle by which bodies persist in a state of motion or rest, or a power implanted in all matter, by which it resists any change endeavoured to be made in its state. See MECHANICS.

INFANTE, and INFANTA, appellations severally given to all the sons and daughters of the kings of Spain and Portugal, except the eldest. The dignity of the title consists in the pre-eminence implied by styling the children of the king, *the* children. This mode of speech has obtained in other countries; as, the son of France.

INFANTRY, in military economy, the whole body of foot-soldiers. It is so called from an event in Spanish history. An infanta of Spain, learning that the army commanded by her father had been defeated by the Moors, assembled a body of foot soldiers, and, with these, engaged, and totally routed, the enemy. This success raised the foot soldiers into a degree of estimation in which they had never before been held, and caused them to be, thenceforward, distinguished by the name of the character under whom this estimation was gained. The light infantry have no camp equipage to carry. Their arms are peculiarly light. They should be accustomed to the pace of four miles an hour, in their usual marches; and capable of exceeding this by one mile, on extraordinary occasions. The British army was long without light-infantry; but, at present every regiment has a company of this kind, the station of which is on its left.

INFINITIVE, in grammar, the name of one of the moods, or modes of conjugation.

INFUSORIA, the fifth order of the class vermes, in the Linnæan system. They are simple microscopic animalcules. This order is scarcely distinguished from the Intestina and Mollusca, but by the minuteness of the individuals belonging to it, and their spontaneous appearance in animal and vegetable infusions. The process by which their numbers are increased is no less astonishing than their first production. Several of the genera often seem to divide themselves, into two or more parts, and become new and distinct animals. The volvox and others are remarkable for their continual rotatory motion, supposed to be intended for the purpose of straining their food out of the water.

Ink, a liquid used to mark letters upon paper. Black writing ink is usually made of galls, copperas, gum-arabic, and water. The basis of the common writing ink, is the fine black, or dark blue precipitate formed by the soluble part of the gall-nut, and a solution of the sulphate of iron, or copperas. This precipitate is kept suspended by means of gum-arabic. The following are good recipes for making ink.

1. Put into a stone or glass bottle, three ounces of finely powdered galls, one ounce of copperas, or green vitriol, one ounce of logwood finely rasped or bruised, one ounce of gum-arabic and a quart of soft water. The bottle is to stand for ten days in a warm place and is to be frequently shaken. Ink may be kept from moulding by the addition of cloves.

2. To one quart of soft water add four ounces of galls, one of copperas roughly bruised: and two of gum arabic.

M. Ribaucourt in the Annales de Chimie directs eight ounces of Aleppo galls, and four ounces of logwood to be boiled in twelve pounds of water, till the quantity is reduced to one half; when the liquor should be strained through a linen or hair sieve into a proper vessel. Four ounces of sulphate of iron, (green vitriol) three ounces of gum arabic; one ounce of sulphate of copper (blue vitriol); and a similar quantity of sugar candy, are now to be added: the liquid should be frequently shaken, to facilitate the solution of the salts. As soon as these ingredients are perfectly dissolved, the composition is suffered to subside for twenty four hours; when the ink may be decanted from the gross sediment, and preserved for use in glass or stone bottles, well stopped. This ink exhibits a purplish black colour in the bottles; but the writing performed with it is said to be of a beautiful black cast, which it retains unaltered, for a considerable length of time.

3. Red writing ink: a quarter of a pound of Brazil-wood, boiled in a quart of water, to which is to be added two ounces of gum and as much alum.

Blue ink may be made by diffusing Prussian blue or indigo in gum-water.

Yellow ink is nothing more than a solution of gamboge in gum-water.—Other colours may be made from a strong decoction of the ingredients used in dying, mixed with a little alum and gum arabic.

Sugar mixed in ink prevents it from drying; this property renders it easy to take off an impression of any writing, and in this way letters, &c. are copied in merchant's counting-houses. The writing is to be made with ink containing sugar, and when done it is laid on the copying press, a blank sheet of proper paper damped is put over it, and by the pressure of the machine a fac simile is struck off. On common occasions the impress may be made with a hot flat iron being passed over instead of the press.

INK, *Indian*, a preparation manufactured in China, and other parts of Asia, and there used in writing. In Europe, this ink is employed in shadowing drawings. By appropriate experiments Dr. Lewis has shown, that this substance is composed of fine lamp-black, and animal-glue.

INK, *Printing*, a composition of linseed-oil, black rosin, hard-soap, and lamp-black.

INK, *sympathetic*. Among the amusing experiments of the art of chemistry, the exhibition of sympathetic inks holds a distinguished place. With these the writing is invisible until some re-agent gives it opacity. We shall here mention a few out of a great number that a slight acquaintance with chemistry may suggest to the student. 1. If a weak infusion of galls be used, the writing will be invisible till the paper be moistened with a weak solution of sulphate of iron. It then becomes black, because these ingredients form ink. 2. If paper be soaked in a weak infusion of galls, and dried, a pen dipped in the solution of sulphate of iron will write black on that paper, but colourless on any other paper. 3. The diluted solutions of gold, silver or mercury, remain colourless upon the paper, till exposed to the sun's light, which gives a dark colour to the oxides and renders them visible. 4. Most of the acids or saline solutions being diluted, and used to write with, become visible by heating before the fire; which concentrates them, and assists their action on the paper. 5. Diluted prussiate of potash affords blue letters when wetted with the solution of sulphate of iron. 6. The solution of cobalt in aqua regia when diluted, affords an ink which becomes green when held to the fire; but disappears again when suffered to cool: and 7. The oxide of cobalt dissolved in acetous acid, and a little nitre added, will exhibit a pale rose colour when heated, which disappears when cold.

Inquisition, in modern history an ecclesiastical court, founded by Innocent III. who, in the twelfth century, sent father Dominic and others, to excite the Catholic princes and people to extirpate heretics, to inquire into their number and quality, and to transmit a faithful account of these particulars. From the nature of their office, these agents were called *inquisitors*; and thus arose a tribunal which was received in all Italy, and throughout the dominions of Spain, excepting the kingdom of Naples, and the provinces of the Netherlands. The principle of jurisprudence upon which the Inquisition proceeds, is that of taking no other proof of a delinquent's guilt than his own confession. He is confined, and sometimes tortured, till he tells the cause of his imprisonment. He is accused of no specific charge; but told that his guilt is known, and required to acknowledge it. The ignorance of the authors of such an institute cannot need to be pointed out. It shows, that they have shed blood with as much moral innocence as the tyger. All that they can be charged with is, a perversity to which intellect alone has the misfortune to be subject. It is not among the least advantages of the present turbulent times, that the Inquisition is almost wholly abolished from Europe. We trust this infernal court will in a short time be only known by report and tradition.

INSECT, in natural history, a class of animals distinguished, among the moderns, by having six or more feet. In zoölogy, that branch which treats of insects, is denominated entomology. See ENTOMOLOGY.

The name *insect*, a contraction of the Latin word *insecta*, is derived from a different characteristic. It means *insected*, or *cut in*; and alludes to that division of the body which prevails in many of the species, and which strikes the eye of the least attentive observer.

INSOLATION, a term sometimes made use of to denote that exposure to the sun, which is made in order to promote the chemical action of one substance upon another. One of the most striking experiments of this kind is that of the exposure of vegetables, as fresh-gathered cabbage leaves, in a glass jar of water to the rays of the sun, by the action of which a large quantity of pure oxygen gas is obtained.

INSTRUMENTS, mathematical: a common case of these contains, 1. A pair of plain compasses. 2. A pair of drawing compasses. 3. A drawing-pen. 4. A protractor. 5. A parallel ruler. 6. A plain scale. 7. A sector, besides black lead pencils.

INSURANCE, in law and commerce, the act of providing against a possible loss, by entering into contract with one who is willing to give assurance; that is, to bind himself to make good such possible loss, upon the contingency of its occurrence. In this contract, the chances of benefit are equal, to the insurer and the assurer. The first actually pays a certain sum, and the latter undertakes to pay a larger, if an accident should happen. The one, therefore, renders his property secure; the other receives money, with the probability that it is clear gain.

The words insurance and assurance are ordinarily confounded; insomuch that an insurance is said to be, a contract, whereby a party engages to pay the loss of another, &c. but, properly, an insurance is not a contract, insurance being the act of the person insuring, and assurance that of him with whom he insures.

The word 'sure,' is a contraction of 'secure.' To make sure, is to make secure. Now, if A wishes to make his property secure, he goes to B, with whom he insures it; that is, he gives a consideration, for which B a-sures it, or makes it secure to him. B is the assureur, a-surer, or maker secure; A, the assurée, a-sured, or made secure; and from these French words, are derived the English ones, assurer and assuree. A, now, says, that his house is a-sured, and that, with respect to the contingencies of that house, he is a-sured; and why? Because he has in-sured by contract with B. The insurance, meanwhile, is no contract, because that consisted, not in engaging to do any thing, but in laying down a consideration, for which the engagement, or assurance, was given. A has insured; B, assured.

There are insurances made against *fire*, and against the risks attending on *sea-voyages*: likewise life insurances. On the latter subject see LIFE *annuities*. To find what premium must be given for an insurance of property, at any rate per cent. Multiply the value of the property to be insured by the rate, and divide the product by 100, which gives the premium. Example. I insure my house and goods for 2000*l.* for which I pay the Royal Exchange office $\frac{1}{10}$th per cent, and also $\frac{1}{8}$th per cent is paid to government for duty, what do I pay annually,

2000*l.* × $\frac{1}{10}$ = 200*l.* this divided by 100 gives 2*l.* for premium. The duty will be 2000 × $\frac{1}{8}$ = 250*l.* which divided by 100 gives 2*l.* 10*s.*; so that the premium and duty will be 4*l.* 10*s.* for the insurance of 2000*l.*

The premium on sea insurances is a per centage on the sum insured, and is usually taken in guineas. All sea insurances pay a duty of 5*s.* per cent for foreign voyages, and 2*s.* 6*d.* per cent. for coasting voyages to and from any part of the kingdom. Example. A merchant in London has consigned to him from Jamaica 100 hogsheads of sugar, valued at 20*l.* each, which he insures at 6 guineas per cent, what does he pay?

Answer. 2000 at 6*l.* 6*s.* per cent = 126*l.*
Duty at 5*s.* per cent - - - - - - = 5
131*l.*

INTEREST is the sum of money paid, or allowed for the loan or use of some other sum, lent for a certain time, according to a fixed rate. The sum lent is called the *principal*: the sum per cent. agreed on as interest, is called the *rate*, and the principal and interest added together is called the *amount*. Interest is distinguished into *simple* and *compound*.

INTEREST, *Simple*, is that which is reckoned on the principal only, at a certain rate for a year, and at a proportionately greater or less sum, for a greater or less term: thus, if 5*l*. is the rate of interest of 100*l*. for one year, 10*l*. is the interest for two years, 20*l*. for four years, &c. The rules for finding the interest of money are the following: Multiply the principal by the rate, and divide the product by 100, the quotient in the interest for a year: thus the interest of 300*l*. at 5 per cent. for a year, is $300 \times \frac{5}{100} = \frac{1500}{100} = 15l.$

Multiply the interest for one year by the number of years, and the product is the interest for the same. The interest of 500*l*. for seven years, at 5 per cent., is $25l. \times 7 = 175l.$

The 365th part of the yearly interest is always considered as the proper interest for a day, and its multiples as the interest for any number of days: thus, at 5 per cent., the legal rate, the interest for a day is $\frac{.05}{365} = .0001369$; and the interest for 12 days, at the same rate, is $.0001369 \times 12 = .0016428$. Hence, by means of the following table, all calculations at 5 per cent. simple interest are easily performed, for any number of days.

Days	Amount.	Days	Amount.	Days	Amount.	Days	Amount.
1	,00013	26	,00356	51	,00698	76	,01041
2	,00027	27	,00369	52	,00712	77	,01054
3	,00041	28	,00383	53	,00726	78	,01068
4	,00054	29	,00397	54	,00739	79	,01082
5	,00068	30	,00410	55	,00753	80	,01095
6	,00082	31	,00424	56	,00767	81	,01109
7	,00095	32	,00438	57	,00780	82	,01123
8	,00109	33	,00452	58	,00794	83	,01136
9	,00123	34	,00465	59	,00808	84	,01150
10	,00136	35	,00479	60	,00821	85	,01164
11	,00150	36	,00493	61	,00835	86	,01178
12	,00164	37	,00506	62	,00849	87	,01191
13	,00178	38	,00520	63	,00863	88	,01205
14	,00191	39	,00534	64	,00876	89	,01219
15	,00205	40	,00547	65	,00890	90	,01232
16	,00219	41	,00561	66	,00904	91	,01246
17	,00232	42	,00575	67	,00917	92	,01260
18	,00246	43	,00589	68	,00931	93	,01273
19	,00260	44	,00602	69	,00945	94	,01287
20	,00273	45	,00616	70	,00958	95	,01301
21	,00287	46	,00630	71	,00972	96	,01315
22	,00301	47	,00643	72	,00986	97	,01328
23	,00315	48	,00657	73	,01000	98	,01342
24	,00328	49	,00671	74	,01013	99	,01356
25	,00342	50	,00684	75	,01027	100	,01369

The method of using the foregoing table is this: Multiply the figures corresponding with the number of days, by the sum: thus, if the interest of 75*l.* for 61 days be required: opposite to 61 is the number .00835, which, multiplied by 75, gives .62625 of a pound, which reduced, by multiplying by 20, 12, and 4, gives 12*s.* 6¼*d.*

INTEREST, *Compound*, or interest upon interest, is that which is paid not only for the use of the money lent, but also for the use of the interest as it becomes due. Almost all questions relating to compound interest may be worked by means of the following tables:

TABLE I.

Shewing the Sum to which 1*l.* Principal will increase at 5 per cent. Compound Interest, in any number of years not exceeding a hundred.

Yrs.	Amount.	Yrs.	Amount.	Yrs.	Amount.	Yrs.	Amount.
1	1.05	26	3.555	51	12.040	76	40.774
2	1.102	27	3.733	52	12.642	77	42.813
3	1.157	28	3.920	53	13.274	78	44.953
4	1.215	29	4.116	54	13.938	79	47.201
5	1.276	30	4.321	55	14.635	80	49.561
6	1.340	31	4.538	56	15.367	81	52.039
7	1.407	32	4.764	57	16.135	82	54.641
8	1.477	33	5.003	58	16.942	83	57.373
9	1.551	34	5.253	59	17.789	84	60.242
10	1.628	35	5.516	60	18.679	85	63.254
11	1.710	36	5.791	61	19.613	86	66.417
12	1.795	37	6.081	62	20.593	87	69.737
13	1.885	38	6.385	63	21.623	88	73.224
14	1.979	39	6.704	64	22.704	89	76.886
15	2.078	40	7.039	65	23.839	90	80.730
16	2.182	41	7.391	66	25.031	91	84.766
17	2.292	42	7.761	67	26.283	92	89.005
18	2.406	43	8.149	68	27.597	93	93.455
19	2.526	44	8.557	69	28.977	94	98.128
20	2.653	45	8.985	70	30.426	95	103.034
21	2.785	46	9.434	71	31.947	96	108.186
22	2.925	47	9.905	72	33.545	97	113.565
23	3.071	48	10.401	73	35.222	98	119.275
24	3.225	49	10.921	74	36.983	99	125.239
25	3.386	50	11.467	75	38.832	100	131.501

To find by means of the table what any sum will amount to in a given number of years.—Multiply the number in the table, opposite to the term of years, by the sum, and the product will be the answer.

Ex. 1. To what sum will 500*l.* amount in 44 years, at 5 per cent. compound interest?

Opposite to 44 in the table I find 8.557, this I multiply by 500, and the answer is 4278*l.* 11*s.* 6*d.*

To find the number of years in which a given sum will increase to another given sum, in consequence of being improved at Compound Interest.— Divide the latter sum by the former, and the sum in the table which is the nearest to the quotient will shew the term required.

Ex. 1. In what time will 200*l.* increase to 1,500*l.* if improved at 5 per cent. compound interest?

$\frac{1500}{200} = 7.5$. The nearest number in the table to 7.5 is 7.391, opposite to which is 41, the number of years. Of course 200*l.* in a little more than 41 years would, by being accumulated at compound interest, at 5 per cent. amount to 1,500*l.*

TABLE II.

Shewing the Sum to which 1*l.* per Annum will increase at 5 per cent. Compound Interest, in any number of Years not exceeding a hundred.

Yrs.	Amount.	Yrs.	Amount.	Yrs.	Amount.	Yrs.	Amount.
1	1,00	26	51,11	51	220,81	76	795,48
2	2,05	27	54,66	52	232,85	77	836,26
3	3,15	28	58,40	53	245,49	78	879,07
4	4,31	29	62,32	54	258,77	79	924,02
5	5,52	30	66,43	55	272,71	80	971,22
6	6,80	31	70,76	56	287,34	81	1020,79
7	8,14	32	75,29	57	302,71	82	1072,82
8	9,54	33	80,06	58	318,85	83	1127,47
9	11,02	34	85,06	59	335,79	84	1184,84
10	12,57	35	90,32	60	353,58	85	1245,08
11	14,20	36	95,83	61	372,26	86	1308,34
12	15,91	37	101,62	62	391,87	87	1374,75
13	17,71	38	107,70	63	412,46	88	1444,49
14	19,59	39	114,09	64	434,09	89	1517,72
15	21,57	40	120,79	65	456,79	90	1594,60
16	23,65	41	127,83	66	480,63	91	1675,33
17	25,84	42	135,23	67	505,66	92	1760,10
18	28,13	43	142,99	68	531,95	93	1849,10
19	30,53	44	151,14	69	559,55	94	1942,56
20	33,06	45	159,70	70	588,52	95	2040,69
21	35,71	46	168,68	71	618,95	96	2143,72
22	38,50	47	178,11	72	650,90	97	2251,91
23	41,43	48	188,02	73	684,44	98	2365,61
24	44,50	49	198,42	74	719,67	99	2484,78
25	47,72	50	209,34	75	756,63	100	2610,02

I. To find in what time a given annuity will amount to a given sum at compound interest.—Divide the given sum by the given annuity, and the number in the table nearest to the quotient will be the answer.

Ex. 1. A person owes 1,000*l.* and resolves to appropriate 20*l.* per annum, to be accumulated at 5 per cent. per ann. compound interest, in how many years will the debt be paid?

$\frac{1000}{20} = 50$. The nearest number in the table to 50 is 51.11, and the number answering to this is 26, so that in less than 26 years a debt of 1,000*l.* would be extinguished by laying by, and accumulating at compound interest, annually 20*l.* per ann. If the rate of interest had been 6 per cent. 24 years would have paid the debt, but at 4 per cent. it would have taken between 28 and 29 years.

II. To find how much a given annuity will amount to in a given term, at 5 per cent. compound interest.—Multiply the given annuity by the number in the table standing opposite to the given term of years.

Ex. 1. I can lay by 50*l.* per annum with its interest; that is, I can appropriate 50*l.* a year to be accumulated at 5 per cent. compound interest, how much shall I have saved if I live 21 years?

Opposite to 21 years I find 35.719, which multiplied by 50, gives 1785.9. Answer, 1785*l.* 18*s.*

III. The PRESENT VALUE of an annuity is that sum which, if improved at compound interest, would be sufficient to pay the annuity. For this the following table is adapted:

TABLE III.

Shewing the present Value of an Annuity of 1*l.* for any number of Years not exceeding 100, at 5 per cent. per annum, Compound Interest.

Yrs.	Value.	Yrs.	Value.	Yrs.	Value.	Yrs.	Value.
1	,952	26	14,375	51	18,338	76	19,509
2	1,859	27	14,643	52	18,418	77	19,532
3	2,723	28	14,898	53	18,493	78	19,555
4	3,545	29	15,141	54	18,565	79	19,576
5	4,329	30	15,372	55	18,633	80	19,596
6	5,075	31	15,592	46	18,698	81	19,615
7	5,786	32	15,802	57	18,760	82	19,633
8	6,463	33	16,002	58	18,819	83	19,651
9	7,107	34	16,192	59	18,875	84	19,668
10	7,721	35	16,374	60	18,929	85	19,683
11	8,306	36	16,546	61	18,980	86	19,698
12	8,863	37	16,711	62	19,028	87	19,713
13	9,393	38	16,867	63	19,075	88	19,726
14	9,898	39	17,017	64	19,119	89	19,739
15	10,379	40	17,159	65	19,161	90	19,752
16	10,837	41	17,294	66	19,201	91	19,764
17	11,274	42	17,423	67	19,239	92	19,775
18	11,689	43	17,545	68	19,275	93	19,785
19	12,085	44	17,662	69	19,309	94	19,796
20	12,462	45	17,774	70	19,342	95	19,805
21	12,821	46	17,880	71	19,373	96	19,815
22	13,163	47	17,981	72	19,403	97	19,823
23	13,488	48	18,077	73	19,432	98	19,832
24	13,798	49	18,168	74	19,459	99	19,840
25	14,093	50	18,255	75	19,484	100	19,847

To find the present value of an annuity for a term of years.—Multiply the number in the table opposite to the given term of years, by the sum, and the product is the answer.

Ex. 1. What is the present value of an annuity of 126*l.* for 21 years?

In the table, opposite 21 is 12.821; this multiplied by 126, gives 1615.465 = 1615*l.* 9*s.* 3*d.*

INTERVAL, in music, the difference between the number of vibrations, produced by one sonorous body of a certain magnitude and texture, and of those produced by another of a different magnitude and texture, in the same time.

INTESTINES, one continued body or tube reaching from the stomach to the anus. This tube in the human species is five or six times as long as the individual to which it belongs is high.

INVOICE, in commerce, an account, in writing, of merchandise, with its value, customs, charges, and other concomitants.

IONIC *order*, in ARCHITECTURE, which see.

IPECACUANHA, in medicine, a root growing in South-America. Very small doses of this root, in a pulverized state, are powerful emetics.

IRON, in mineralogy, one of the imperfect metals, but the hardest and most useful, as well as the most plentiful. Iron is attracted by the magnet, and is capable of becoming magnetic; but it retains this quality only a short time. Iron unites with carbon; and, according to the proportions, the compound is either BLACK-LEAD or STEEL, which see.

Iron is also sometimes united with sulphur. See SULPHURET, and VITRIOL.

Cast-iron may be called unripe, or raw, iron. It is distinguished by the following properties: it is scarcely malleable at any temperature; it is generally so hard as to resist the file; it can neither be hardened nor softened by ignition and cooling; it is contaminated with various foreign circumstances, as carbon and silica, the proportions of which vary according to circumstances.

Wrought-iron is produced from cast, by melting;

and, if perfectly pure, would be a simple substance, composed of nothing but iron.

While the cast-iron is in a state of fusion, it is constantly stirred by a workman, that every part of it may be equally exposed to the air. In about an hour, the hottest part of the mass begins to heave and swell, and to emit a blue, lambent flame. This continues nearly an hour more; and, by that time, the conversion is completed. The heaving is evidently produced by the action of an elastic fluid, or gas, struggling to escape.

Cast-iron may also be brought into a malleable state, by passing it, while heated, through rollers. This method was discovered by Henry Cort, of Gosport, who obtained, by letters-patent, the exclusive right of using it. Wrought English iron, wrought in this manner, is said to be equal, and even sometimes superior, to the best Swedish iron; but, Cort's invention apart, the Swedish is considered as the finest sort, and best for working; and the English, as best adapted for bars of stoves, and similar uses; while the Spanish, otherwise equal to Swedish, is found to crack; and the German is too coarse for other than ordinary occasions.

Irony, in rhetoric, a figure which consists in the use of expressions contrary to the meaning they are intended to convey. Irony frequently fails in effect, and more especially in writing. The reason is, that it is seldom sufficiently direct: now, if this happen in speaking, the deficiency of the phraseology is easily made amends for, by the manner in which it is delivered: but, in writing, to which none of the energies of voice or gesture can be transferred, a deficiency in the expression will wholly destroy the figure. A great consideration, therefore, it is, that irony be extremely apparent: it is understood, that Swift was actually thought, by many persons, to be serious, when he proposed that the poor of Ireland should eat their children, in order to lower the price of provisions. It should be a rule that, "the thing said ironically be such as is manifestly untrue." Thus, Raynal, in speaking of the religion of the Mexicans, describes one of its rites, which consisted in eating part of a figure of their god, made of dough, and baked for the occasion, and which they believed to be the real substance of the god. This account, he prefaces with an observation, that they have one ceremony, "of the resemblance of which there are no traces in any other part of the world:" a stroke of irony so palpable, that his reader cannot but be alive to his meaning.

Isinglass, in commerce, a substance which is found to be composed of the sounds, or air-bladders, of those fish from which this membrane may be separated with sufficient ease. The sounds of freshwater fish are to be preferred, because these are the most transparent, flexible, and delicate; but those of the cod and ling are collected by the fishermen of Newfoundland and Iceland. The coarser sorts of isinglass are made of the intestines of the fish. The preparation of isinglass, from salt-water fish, is merely that of freeing the sound from the membranes out of its sides, with the knife; putting it, for a few minutes, in lime-water, that its oily principle may be absorbed; and, lastly, washing it in clean water; the sounds of fresh-water fish do not need the whole of this process. The vermicular form in which isinglass is usually seen, is supposed to have been given to it by its original manufacturers, the Russians, rather to conceal its essence, than with any other view. In order to effect it, the membranes are rolled round each other, to the thickness of a finger; and the rolls kept in the required form till dry, by fastening them with pegs.

ISATIS. See WOAD.

ISLAM, the true faith, an appellation applied by the Mohammedans to their religion. See MOHAMMEDANISM.

ITALY, one of the finest countries in Europe, is bounded on the north, north-west and north-east by France, Switzerland, the Grisons, and Germany: on the east by the gulf of Venice; and on the south and west by the Mediterranean. It was formerly the seat of the Roman empire, and afterwards of the spiritual dominion of the pope. Italy till very lately was divided into a great number of states which differed much in extent and importance. The governments of several of its principalities, duchies, republics, &c. have undergone various changes since the French revolution, but at the present moment the whole of Italy is a kingdom, on the throne of which the infant son of Buonaparté is supposed to sit, and on whom is already conferred the title of king of Rome. It is evidently, therefore, the intention of the Emperor of France to make Rome, once the mistress of the world, the second city on the continent. The pope is now, fortunately, reduced to a mere cypher, deprived of all secular dominion, and can no longer lord it over the consciences of Christians. The destruction of his spiritual power is one of the most important advantages that have resulted to the world, by the disastrous events of the last twenty years.

IVORY, the substance of the tusk of the elephant See **HORN**. Ivory is esteemed for its cream-like colour, the fineness of its grain, and the high polish it is capable of receiving. That of India loses its colour and becomes yellow: but that of Acheen and Ceylon is free from this imperfection. Ivory is used as a material for toys; and as pannels for miniature paintings. To prepare it for this latter purpose, it is to be washed with the juice of garlic, or some other absorbent composition, to remove its oily particles. The shavings of ivory may be reduced into a jelly, of a nature similar to that of hartshorn; or, by burning in a crucible, they may be changed into a black powder, which is used in painting, under the name of *ivory-black*.

Ivory may be stained or dyed. A black colour is given it by a solution of brass, and decoction of logwood; a green one, by a solution of verdegris; and a red, by being boiled with brazil-wood, in lime-water.

J.

J, when reckoned a distinct letter, is the eleventh in the alphabet, and has always a soft sound in English, like that of the soft *g*, as *judge*, *jet*, *jack*.

JACK, in mechanics, a well-known engine of common use, for raising great weights of any kind. The ordinary kitchen-jack is a compound engine, in which the weight is the power applied to overcome the friction of the parts, and the weight with which the spit is charged; and in which a steady and uniform motion is obtained by means of the fly.

JACOBUS, an English gold coin, worth twenty-five shillings, first struck in the reign of James I, of England, whence the name.

JACOBIN, in church history, the same with DOMINICAN, which see.

JACOBIN, in civil history, a name given in France, during the Revolution, to the more rigid friends of democratical government. The appellation originated in the circumstance, that the meetings of that party were held in a building antiently belonging to the JACOBIN monks. See ILLUMINANTS.

JACOBITE, in church history, the name of two sects of Christians, in Syria, and the adjacent countries. Of these, the one adheres to the Roman church, and the other, to the Greek.

JACOBITE, in civil history, an English partizan, whose tenets stand opposed to those who approve of the revolution of 1688. A jacobite maintains the right of James II. and his family, to the throne; and, of consequence, is supposed to defend absolute monarchy, founded upon the "jure divino," or "divine right" of kings, and the non-resistance of subjects.

JAGHIRE, in East-India affairs; means a grant of land from a sovereign to a subject, revokable at pleasure, but generally a life rent. The jaghire of the Carnatic is a large tract of land in Hindostan subject to the English East-India company, containing 2440 square miles, and producing an annual revenue of 150,000l.

Jalap, in the materia medica, the root of a species of convolvulus, or bind-weed, indigenous in the province of Xalapa, in New Spain. In some disorders, jalap is used as a mild cathartic.

Janissaries, foot soldiers in the Turkish army. The word is said to signify, a new band, or military body. It was Osman, Ottoman, or Othomann, or according to others, Amurath the Conqueror, who first instituted this order. It is of rank superior to that of the other divisions of the army. Its numbers generally exceed forty thousand. The janissaries carry either fire-arms, or arrows, according to the part of the empire in which they serve.

Jansenists, a sect of Christians, who follow, or who followed, the opinions of Jansenius, bishop of Ypres, in France. These opinions respected grace and predestination.

January, the name of the first month of the year, as now generally used in Europe. Its name was given by the Romans, from *Janus*, the divinity who presided over the new year, and all new undertakings. See **Year**.

Japan, a large empire in the most eastern part of Asia. It is composed of several islands, the chief of which, called Niphon, was discovered in 1542 by some Portuguese who were cast on shore in a tempest. The whole empire is divided in seven principal countries, which are subdivided into 70 provinces. It is the richest country in the world for gold, and other commodities.

Japan, in commerce, a mode of varnishing, first learned of the Japanese. The basis of japan-varnishes is composed of seed-lac, resin, and spirit of tine. To this is added the colour required. Figures or flowers, upon the japan, should be executed with coloured varnish; but oil, which cannot be lasting, is frequently substituted. All bodies, the substance of which is firm, may be japanned. Paper is too flexible, unless under the form of "papier maché."

The French coat the surface of the body to be japanned; and this is convenient in the instance of wood, because the priming substance fills up the inequalities of the surface: but the japan, executed in this manner, cracks, and flies off in flakes; and, therefore, the productions of the manufacturers of Birmingham, who work on metal, and who never have adopted this plan, are greatly preferable to those of France.

Jargon, Zircon, in mineralogy, a semi-transparent, precious-stone, of the nature of the diamond, but softer, and found in the island of Ceylon. Its colour is various; there being grey, greenish-white, yellowish, reddish-brown, and violet. It usually possesses considerable lustre, at least, internally.

Jargonia, in geology, a species of earth, found in the gem *jargon*. In one hundred parts of jargon, Klaproth has found sixty-eight of this earth, which possesses peculiar properties. It is of a white colour. The particulars are yet scarcely known.

Jasper, in mineralogy, a genus of stones, of the siliceous class. It includes the *blood-stone*, so called from its being supposed efficacious in stopping blood; a quality probably imputed on account of the crimson spots which diversify its green-coloured substance. Daubenton enumerates fourteen other varieties.

JATROPA, in botany, a genus of plants, of which there are fourteen species: the Jatropa elastica, or elastic gum-tree, is a native of Guiana, of Quito, and Brazil. The Indians, by an incision in the bark, extract a viscid white substance from it, which they receive in moulds to make rings, bracelets, girdles, syringes, hats, boots, flambeaux, &c. This substance is well known in Europe, and has been much used for a variety of purposes. It is very elastic, rubs out black-pencil marks, may be dissolved in ether, and oil, and is in this state a proper substance to be used as a varnish for coating silk, &c. to render it impervious to air and water.

JESUITS, members of the *society of Jesus*, a religious order of considerable celebrity in modern history. The society of Jesus was instituted by Ignatius Loyola, A. D. 1540. It was a religious body, with a military constitution. Its superior was called its general; and his government was despotic. The plan of this society was at once the production of a large, and of a narrow mind. On one side it is magnificent; on the other, contemptible. Its motive, was benevolent ambition.

Unlike other communities of monks, the duties of this were to be performed in active life. Its object was universal empire. By every exertion of talent, by every useful work, by every public virtue, and by every private intrigue, it sought to attain an imperious ascendancy over mankind. Its aim was to rectify every disorder in society; and the mean by which this was executed, was the possession of unlimited power. Who does not see, in such a design, the vision of ardent goodness, the aspiration of philanthropic zeal? and who does not equally see, a perfect unacquaintance with the causes from which the phenomena of human society result? A man who forms a design like that of Loyola and his successors, should reflect, that a system of despotism, however strong its foundation be laid in virtue, will infallibly decline into oppression.

Had the jesuits succeeded in their plan, they must have become the scourge of mankind; as it happened, they were checked, by those with whose interests they interfered, while their colossal growth was yet in a state of infancy.

The order was expelled England in 1604; Venice, 1606; Portugal, 1759; France, 1764; Spain and Sicily, 1767; and abolished, by Clement XIV. 1773. When the jesuits were ejected from Spain, such was the relative magnitude of the power which the government had to overcome! they were seized by an armed force, at the same minute of the same day, in every town where they had residence, in that extensive monarchy; and hurried away to ships, that were waiting to carry them to another country.

JESUIT'S *bark*, see CINCHONA.

JET, in natural history, a bituminous substance, which Magellan supposes to be similar to amber, differing only in its colour, which is black. Great quantities of it have been dug up in the Pyrennees, and it is also found in parts of Portugal, Spain, Italy, Germany, Prussia, Sweden, and Ireland. It bears a good polish, and is made into trinkets. It is also reduced into powder, formed into a varnish, and, when mixed with lime, it is an extremely durable cement.

Jet, *d'eau*, in hydraulics, see Hydraulics. Artificial Jets or fountains are made by means of compressed air. The air is forced into a vessel formed for the purpose by means of a syringe. Fig. 8, Pl. Hydrostatics, the stop cock is turned, and a jet of any kind being fixed where the syringe was, the fountain will, when the cock is turned, play to a considerable height, according as more or less air is forced into the vessel. A fountain of this kind properly placed, in the sun's rays, will exhibit a beautiful artificial rainbow.

Jews, see Judaism.

Job, or the book of Job, a canonical book of the Old Testament, containing the narrative of a series of misfortunes which happened to a man named Job, as a trial of his patience and fortitude; together with conferences which he held with his several friends on the subject of his misfortunes, and the manner in which he was restored to happiness. Many of the Jewish Rabbins pretend that this relation is purely a fiction: others think it a simple narrative of a matter of fact, just as it really happened; while a third class of critics acknowledge that the ground work of the story is true, but that it is written in a poetical style, and decorated with peculiar circumstances, to render the narration more profitable and interesting. Such also is the opinion of Grotius, who supposed that the events recorded in it happened in Arabia, while the Hebrews wandered in the desert. It was probably written by Moses, as it evidently was the work of a Hebrew, of one who had been in Arabia, and of one who wrote before the promulgation of the Mosaic law. These circumstances all attach to Moses, and to no one else.

JONAH, prophecy of, a canonical book of the Old Testament, in which it is related that Jonah about the year 771, B.C. was ordered to go and prophesy the destruction of the Ninevites, on account of their wickedness. But instead of obeying the divine command, he embarked for Tarshish, when a tempest arising the mariners threw him into the sea: he was swallowed by a great fish, which after three days threw him on the shore. After this he boldly preached to the people of Nineveh, and predicted their destruction, which on account of their repentance was averted. Jonah, dreading the suspicion which might attach to him as a false prophet, retired to a mountain at a distance from the city, where he learnt the folly and unreasonableness of his own discontent.

JOSHUA, a canonical book of the Old Testament, containing a history of the wars and transactions of the person whose name it bears. This book is divisible into three parts, the first of which is a history of the conquest of Canaan: the second, which begins with the 13th chapter, is a description of that country, and the division of it among the tribes: and the third, comprised in the last two chapters, contains the renewal of the covenant which he caused the Israelites to make, and the death of their victorious leader.

JUDAISM, the religious doctrines and rites of the Jews, a people of Judah, or Judea. These doctrines and rites are detailed in the five books of Moses, hence called, *the law*. The *Caraites* acknowledge no other; but the *rabbinists*, the second of the two sects of Jews, add those inculcated by the *talmud*. The following is a summary of the religious creed of the Jews: 1. That God is the creator and active supporter of all things. 2. That God is ONE and eternally unchangeable. 3. That God is incorporeal, and cannot have any material properties. 4. That God shall eternally subsist. 5. That God is alone to be worshipped. 6. That whatever has been taught by the prophets is true. 7. That Moses is the head and father of all contemporary doctors, and of all those who lived before and shall live after him. 8. That the law was given by Moses. 9. That the law shall always exist and never be altered. 10. That God knows all the thoughts and actions of man. 11. That God will reward the observance and punish the breach of his law; 12. The Messiah is to come, though he tarry a long time. 13. That there shall be a resurrection of the dead when God shall think fit. These doctrines, commonly received by the Jews to this day, were drawn up about the end of the eleventh century by the famous Jewish rabbi Maimonides.

JUDGE, in polity, an officer who decides causes and prosecutions at law. In the British polity, the title *judge* is retained, where, it should seem, that of *president* would more truly express the functions of the officer who bears it. In chancery, in the ecclesiastical courts, and in the court of admiralty, the judge really *judges*; but in the courts of law, civil and criminal, the *jurors* are the actual judges. There, the judge, as he is denominated, performs a very important duty, but he does not *judge*. He maintains the law, he puts the evidence and pleadings in a compendious point of view; but he submits the question of *judgment* to the jury.

Judges, book of, a canonical book of the Old Testament, so called from its relating the state of the Israelites under the administration of many illustrious persons who were called judges, from the circumstance of their being both the civil and military governors of the people, and who were raised up by God upon special occasions after the death of Joshua till the time of their making a king. By this book we learn that gross impiety sprung up after the death of Joshua, and we are made acquainted with the dispensations of heaven towards this people.

Judgment, in metaphysics, a faculty of the soul, whereby it compares ideas, and perceives their agreement or disagreement; thus, the understanding compares the two ideas of the sun and the moon; and, finding the idea of the sun greater than that of the moon, the judgment decides, and the will acquiesces in that decision.

Julian *year*, see Year.

July, the seventh month of the year. It is derived from the Latin *Julius*, the surname of C. Cæsar, the dictator, who was born in this month; and was given by Mark Antony.

June, the sixth month of the year, in which is the summer solstice. The word is derived from the Latin *Junius*; which some imagine to come from *Juno*, and others from *junioribus*; this month being for young people, as May was for old.

Jurisprudence, the science of law, which see.

Juror, in law, one of the men who compose a *jury*.

Jury, in law, a certain number of persons, sworn to decide justly on the matter before them. The constitution of England, in committing the administration of justice to the hands of juries, has subjected them to no restraint that can prevent the free discharge of their duty. They are to decide, not only upon the fact, but upon the criminality of the fact. It is also an established maxim, that a juror, in giving his verdict, is to be governed by nothing but his own opinion. Chief-justice Hales has the following passage, in his History of the Common Law of England, chap 12. § 11.

" In this recess of the jury, they are to consider their evidence, to weigh the credibility of the witnesses, and the force and efficacy of their testimonies; wherein, as I before said, they are not precisely bound to the rules of the civil law, *viz*. to have two witnesses to prove every fact, unless it be in cases of treason; nor to reject one witness, because he is single; or always to believe two witnesses, if the probability of the fact does upon other circumstances reasonably encounter them; for the trial is not here simply by witnesses, but *by jury*; nay, it may so fall out, that a jury upon their own knowledge may know a thing to be false, that a witness swore to be true, or may know a witness to be incompetent or incredible, though nothing be objected against him—and may give their verdict accordingly."

It is a striking and pleasing observation of De Lolme, that " the consequence of the institution of Juries is, that no man in England, ever meets the man of whom he can say, " that man has a power to decide upon my death or life." Juries are of several kinds; among these, there are, in the polity of Britain, *grand* and *petty* juries, in criminal cases; and *common* and *special* in civil.

JURY, *Grand*, a body of men of some consideration in their county, summoned by the sheriff for every session of the peace, every commission of oyer and terminer, and of general gaol delivery, and to whom all indictments are preferred. The summons of a grand juror requires him, in general terms, "to attend, and inquire, present, do, and execute, all those things, which, on the part of our lord the king, shall be then and there required of him." The grand-jury must consist of twelve persons at least and not more than twenty-three; that twelve may be a majority. The members are instructed in the articles of their inquiry, by the justice who presides on the bench. They then withdraw, to sit and receive indictments, which are preferred to them in the name of the king, but at the suit of any private prosecutor; and they are only to hear evidence on the part of the prosecution: for, the finding an indictment is merely in the nature of an inquiry or accusation, which is afterward to be tried and determined; and the grand-jury are only to inquire, whether there be sufficient cause to call upon the party to answer it.

Formerly, the grand-jury used to indorse their decision upon the indictment, in the Latin tongue, but now, they write upon an indictment which they reject, either the words, *Not a true bill*, or, *Not found;* and upon one, of the truth of which they are satisfied, *A true Bill.*

JURY, *Petty*, the panel before which the matter contained in an indictment, information, or record, is tried.

Jury, *Common*, stands opposed to special.

Jury, *Special*, a panel composed of persons, *especially* fitted by the kind of knowledge they possess, to try some peculiar question. There are also special juries, in cases where one of the parties is above the common rank.

Jupiter, in astronomy, ♃, one of the planets, the largest of them all, and most brilliant excepting the planet Venus. Jupiter revolves about the sun, at the distance of 493 millions of miles from that body, and his periodical revolution is estimated at 4330 days, 14^h. 39^m. $2'$ or in about twelve of our years. His longest diameter is nearly 90,000 miles in length; and the length of his day and night is equal to somewhat less than 10 of our hours. It has therefore been calculated that this planet moves in his orbit at the rate of 25,000 miles in an hour, and that his equatorial parts are carried as swiftly as this round the axis, which is 25 times faster than the similar parts of our earth. Jupiter is surrounded with what are called by us his zones or belts, but which have been supposed to be clouds. The axis of Jupiter is so nearly perpendicular to the plane of his orbit that he has little change of seasons. The difference in the length of his polar and equatorial diameters is equal to 6000 miles, the former being to the latter as 12 to 13. This is evidently occasioned by the quick motion round his axis. The gravity of bodies on the surface of this planet is nearly twice as great as on the surface of the earth, that is a body weighing a pound or ton here, would on the surface of Jupiter weigh two pounds or two tons. Jupiter has four satellites revolving about him;

these are frequently eclipsed in the shadow of their primary, or hidden behind his body, and the great subserviency of these eclipses to geography and navigation has occasioned the motions of the satellites to be very carefully observed. See LONGITUDE: SOLAR SYSTEM, and SATELLITES.

JUSTICE, in law, the equitable decision of suits and prosecutions. The laws of England have frequently been made the subject of severe animadversion; and it is not to be wondered at, if a system formed of so many broken parts, of ordinances promulgated at so many different periods, adapted to so many different stages of society, and indeed, made up, in great part, of usage and precedents, and, in civil cases, liable to be changed by every new decision, should appear to these, who look for precision and order, confused and faulty: but whatever censure may be passed upon the unweildy volumes of this code, Calumny herself cannot utter a breath against its administration. The law of England may be irregular; but its justice is sacredly correct. Its decisions may sometimes be erroneous, though it never errs intentionally, but it is not here that the eyes of the reader, at this moment, should be fixed: he should look on the contrast, if he can picture it to his mind, between this country, and one, where, not merely the mistakes of juries, the perjuries of witnesses, the errors of attorneys, or the expenses of proceedings, impede the course of justice, but where the inferior in station can never hope to gain a cause against the superior. The following testimony of an acute foreigner, a native, not of a monarchy, but of what was once considered as the retreat and fastness of continental freedom, will serve to set this matter in a very conspicuous point of view:

"A little after I came to England for the first time (if the reader," says De Lolme, "will give me leave to make mention of myself in this case), an action was brought in a court of justice, against a Prince very nearly related to the crown; and a Noble Lord was also, much about at that time, engaged in a law-suit, for the property of some valuable lead-mines, in Yorkshire. I could not but observe, that, in both these cases, a decision was given against the two most powerful parties; though I wondered but little at this, because I had heard much of the impartiality of law-proceedings in England, and was prepared to see instances of that kind: but what I was much surprised at was, that nobody appeared to be in the least so (not even at the strictness with which the ordinary course of the law had, particularly in the former case, been adhered to), and that those proceedings which I was disposed to consider as *great instances* of justice, to the production of which some circumstances peculiar to the times, at least some uncommon virtue or spirit on the part of the judges, must have more or less co-operated, were looked upon by all those whom I heard speak about them, as being nothing more than the common expected course of things!—This circumstance became a strong inducement to me to inquire into the nature of a government by which such effects were produced."

K

K, the tenth letter of the alphabet, and what is called a double consonant. It has the hard sound of c before *e* and *i*, where according to the English analogy, *c* would be soft, as in the words *kept* and *king*: it is seldom at the end of words except in monosyllables, as *clock*, *back*, &c. It is generally omitted, where it was formerly used, as in *music*, *public*, &c. It is also used between a vowel and the silent *e* final, as *cloke*, *broke*, &c. *k* is silent before *n*: it is borrowed from the Greek *kappa*, and was but little used among the Latins, perhaps never but in words borrowed from the Greek language. As a numeral K was put for 250, and with a stroke at the top $\bar{K}$ stood for 250,000.

KALENDAR, a table of the distribution of time, otherwise called, from the Arabic, an *almanac*. An almanac, indeed, though for no etymological reason, is understood to contain more than a *kalendar*; the latter being simply chronological, while to the former is added various tables; as of tides, terms, interest, and sovereigns. Almanac strictly means a diary; but, according to its miscellaneous composition, it is rather a manual.

There is nothing of mystery, or of extraordinary difficulty, in the construction of a kalendar, tables of the celestial motions being at hand. The operations are these: 1. The computation of the sun's and moon's places, for each day of the year; a labour that may be avoided by taking them from an ephemeris; 2. The finding the dominical letter, and, by its means, distributing the days into weeks; 3. The computation of Easter; and fixing, thence, the moveable feasts; 4. The addition of the immoveable feasts, with the names of the martyrs; 5. The addition of the sun's and moon's places, as before found, with the rising and setting of each luminary, the length of the day and night, the twilight, and the aspects of the planets; 6. The addition of the chief phases of the moon, and the sun's entrance into the cardinal points, that is, the solstices and equinoxes; together with the rising and setting, especially heliacal, of the planets and principal fixed stars.

KALENDAR is also used for any table whatever: thus, lord Bacon expresses a wish for a *kalendar* of doubts; and the list of prisoners to be tried at a sessions, is also called, *the kalendar.*

KALENDAR, *Astronomical*, an instrument composed of a board, on which is pasted a printed paper, and a slider, which carries a hair; and which shews the sun's meridian altitude, right ascension, declination, rising, setting, magnitude, and other phenomena, with greater exactness than a common globe.

KALEND *or* CALEND, in the Roman chronology, the first day of every month. The second, third, fourth, and other days, progressively numbered, were not days that followed, but which preceded, the kalend.

KALI, a marine plant, from which a fixed salt is obtained, in the manner described in the article KELP. From this plant, called, by the Arabs, *al kali*, or *the kali*, all substances that ferment with acids are denominated alkalies; and their quality alkaline, or alkalescent. The mixture of an alkali with an unctuous substance is soap. The mixture of an alkali with siliceous earth, is glass. See Potash.

Kamul, *or* **camel**, a machine for lifting ships. The reason of the application of the name of the animal to the machine, appears to be, that both receive their loads in a recumbent state, and rise when laden.

Khan, in antient and modern history. "This is the word," says sir William Jones, "so variously and so erroneously written by Europeans. The sovereign lord of Tartary is neither the *cham*, as our travellers call him, nor the *han*, as Voltaire will have it; but the *khán* or *cán*, with an aspirate on the first letter." This word is sometimes written *cawn*, or *caun*, with the intention of imitating its native sound: thus, we read of *Ali Cawn*; that is, the lord, or khán, *Ali*. Ali, also, is sometimes written *Ally*, in order to express the broad sound of the *a*: but we must distinguish between the oriental words *Ali* or *Aüli*; the latter signifying, The Magnificent, and in that sense assumed by the East-India company in Hindostan; and by the commander of the French army in Egypt; while the former, as the name of the founder of a division of the Mohammedan faith, is odious everywhere but in Persia.

Kaolin, an earth, which, with petunse, is made into porcelain.

Keel, in naval architecture, a principal part of a ship, and that with which its construction usually commences. If the body of a ship be compared with that of an animal, the keel will be considered as the back-bone, and the timbers as the ribs. The keel, therefore, supports and unites the whole fabric; since the stem and stern are continuations, which serve to connect and inclose the extremities of the sides, by transoms, as the keel forms and unites the bottom by timbers. Keel, in naval architecture, the name of a low, flat bottomed boat, used on the river Tyne, to bring down coals to the colliers. The boats in which the Saxons invaded England, were called keels. A keel is also any hollow vessel; so that the keel of a ship, does not, by its name, carry the idea of a sharp timber, by which the water is cut, but of a vessel itself.

Keeper of the great seal, in modern history, an officer in the British government, who keeps and affixes the great-seal of the kingdom. This office is usually held by the high-chancellor. It is conferred by the act of delivery of the great-seal, by the hands of the sovereign. It is the great-seal which alone gives authority to public acts of the crown. The crown, therefore, *can do no wrong*; it is the lord-keeper who is responsible.

On the authority of Coke, it has been represented, in the article *Chancellor*, that the power of cancelling or destroying the king's proclamation, if contrary to law, is the origin of that title. No etymology, however, can be more absurd. A *chancellor* is a judge at civil-law; so denominated from the latticed chamber, or chamber with a latticed screen, in which it was usual for a judge to sit. The same screen, of which some specimens still remain, has occasioned the east-end of a church to be called the *chancel*. If other argument were necessary, it is manifest that it is not the *chancellor*, *quatenus* *chancellor*, who may cancel, or render void, the acts of the crown, but the *keeper*.

The keeper of the great seal is complimented with the title of lord, and is, necessarily, a member of the privy council.

KELP, in the manufactory of glass, a sort of pot-ash; more particularly used in the composition of green-glass. Kelp, is the calcined ashes of a plant, sometimes called by the same name, but otherwise known by the denominations of sea-thongs, laces, and glass-wort; and which is a thick-leaved sort of *fucus*, or sea-wrack. *Kali* is a species of this plant. Kelp is thrown on the rocks and shores of Scotland, in great abundance; and, in the summer months, is raked together, and dried, as hay, in the sun and wind, and afterward burnt. A more particular account is this: The rocks, which are dry at low-water, are the beds of great quantities of sea-weed, which is cut, carried to the beach, and dried: a hollow is dug in the ground, three or four feet wide; round its margin are laid a row of stones, on which the sea-weed is placed: this is set on fire, and continually replenished; and from the centre, where a perpetual flame is kept up, a liquid, like melted metal, drops into the hollow beneath. When the hollow is full, as it commonly is after a day's burning, all heterogeneous matters are removed; and the kelp, wrought with an iron rake, brought into a uniform consistence, while in a state of fusion. When cool, it consolidates into a heavy, dark-coloured, alkaline substance. This substance is the kelp of the glass-houses; where its use is similar to that of kali, polverine, potash, and pearl-ash.

Kermes, in zoölogy, an insect constituting a species of the insect coccus, found in the excrescences of a species of oak-tree. Kermes, in pharmacy, and dyeing, a kind of oak-gall, produced on an evergreen species of oak. See Oak-*gall*. The kermes resembles a berry. It is of a bright red colour, and full of juice of the same. It is found adhering to the stem and branches of a scarlet-oak, a native of Spain, of Languedoc, and of other hot climates. It is of a vinous smell, and a bitter, though agreeable taste; and its pulp is full of minute eggs of insects. If the berries remain till it be dry, these eggs are hatched; but to prevent this destruction of the dye they are steeped in vinegar.

Kermes-*mineral*, in pharmacy, a preparation of antimony, so called on account of its red colour, resembling that of the kermes.

Kettle-*drum*. See Drum.

Kilogramme, in the new metrical system of France, ten *grammes*, or the weight of one-tenth of a cubit *métre* of distilled water, weighed *in vacuo*, when at its greatest density, which is in the temperature of 39° of Farenheit's thermometer.

King, in ancient and modern history, the name given to an officer who exercises the supreme functions of political government. In Rome the title was used in a more general sense, as denoting the supreme officer in any department of the state; as, king of *sacrifices*.

Though the word *king* is used as the title of the supreme officer of many nations, yet the office it implies is frequently found to vary in essential particulars. All kings, however, may be distributed into two general classes; those who have the sole power of making laws, and those who have only a share of that power. Of these, the first are generally called *absolute kings*, or *monarchs*; the second, *limited kings*.

1. The epithet *absolute*, is, very frequently applied to kings who really possess but little of that description of authority. The generality of governments are of that miserable class, the aristocratic. Few, indeed, are the seeming monarchs who are not governed by the *nobility* or the *priesthood*; a thraldom equally injurious to the prince and to the people, and for which the only remedy is, the admission of the latter into the legislature. The true friends of the prince are the people; the true friend of the people, the prince. An enlightened prince will always wish to promote, to a proper extent, the power of the people; and an enlightened people, in the same measure, that of the prince. A kingdom without a democracy, and a democracy without a king, will always be an aristocracy. China, perhaps, may afford an example exception to the first of these positions; and Attica to the second; but, these singular states apart, their truth has every claim to be allowed. It is equally true, that without an aristocracy, a kingdom will be absolute, and a democracy licentious.

2. It is to the advantage, then, as well of the prince as of the people, that the prerogatives of the crown should be limited. It follows, that we ask, In what should the limitation consist? In the total denial of the prerogative of propounding laws; and of that of personally executing them; the first, be-

cause laws should be founded on the universal interests of the community; interests which a king, if indeed really absolute, might mistake, and which if, as is more commonly the case with such a king, only the chief of an aristocracy, he might not dare to consult: the second, because the administrators of the laws ought to be responsible, while the king ought to be responsible to no man.

King *of Great Britain and Ireland*, the title of a limited sovereignty, of high rank in Europe, and first vested in the person of His present Majesty, George the Third. This title is differently expressed in the Latin: Georgius Tertius, *Dei Gratia, Britanniarum Rex.* On occasion of the Union of Ireland with Great Britain, the armorial bearings of the crown were remarshalled, in the following order: Quarterly, first and fourth, gules, three lions passant, or, for England; second, or, within a double tressure-flory, gules, a lion rampant of the same, for Scotland; third, azure, a harp, or, for Ireland: the whole surmounted by an escutcheon of pretence, containing the paternal coat of Brunswic; *viz. per pale*, gules, two lions, passant, guardant, or, for Brunswic; or, semée of hearts, proper, a lion rampant, azure, for Lunenburg; with, grafted in base, gules, a horse, courant, argent, for ancient Saxony; and, in a shield surtout, gules, the crown of Charlemagne, or, for the arch-treasurership of the holy Roman empire.

"Prerogatives of the King of Great Britain and Ireland," are thus enumerated.

I. The first prerogative of the king, in his capacity of Supreme Magistrate, has for its object the administration of Justice.

1. He is the source of all judicial power; he is the chief of all the courts of law, and the judges are only his substitutes; every thing is transacted in his name; the judgments must be with his seals and executed by his officers.

2. By a fiction of the law, he is looked upon as the universal proprietor of the whole kingdom; he is, in consequence, deemed concerned in all offences, and, for that reason, prosecutions are carried on in his name. Prosecutions are carried on in his name, because the offences are offences against that *peace*, which he undertakes to preserve; or, in general terms, because he is the common patron of all his subjects, and avenger of their wrongs.

3. He can pardon offences; that is, remit the punishment that has been awarded in consequence of his prosecution.

II. The second prerogative of the king, is, to be the *fountain of honour*; that is, the distributor of titles and dignities: he creates the peers of the realm, as well as bestows the different degrees of inferior nobility. He, moreover, disposes of the different offices, either in the courts of law, or elsewhere.

III. The king is the superintendant of commerce; he has the prerogative of regulating weights and measures; he alone can coin money, and can give a currency to foreign coin.

IV. He is the supreme head of the church. In this capacity, he appoints the bishops, and the two archbishops; and he alone can convene the assembly of the clergy.

V. He is, in right of his crown, the generalissimo of all sea or land-forces whatever; he alone can levy troops, equip fleets, build fortresses, and fill all the posts in them.

VI. He is, with regard to foreign nations, the representative, and the depositary, of all the power and collective majesty of the nation; he sends and receives ambassadors; he contracts alliances, and has the prerogative of declaring war, and of making peace, upon whatever conditions he thinks proper.

VII. In fine, and what seems to carry so many powers to the height, is, its being a fundamental maxim, that *the king can do no wrong*: which does not signify, however, that the king has not the power of doing ill, or, as it was pretended by certain persons in former times, that every thing he did was lawful; but only, that he is above the reach of all the courts of law whatever; and that his person is sacred and inviolable. This last position has been disputed, and it has been said that the king directs his ministers, and this is the same thing.—It is not the same thing. The difference amounts to this, that the king is no more able to do wrong himself, than one man is able to shoot another, without a weapon. Let us consider the situation of a minister of Great Britain. He serves an active or an indolent master; one who makes him his servant, or his deputy: in the first case, he receives precise orders for every thing he does; in the second, a general commission, and is told to execute it to the best of his judgment. Under the first supposition, he is ordered to do a certain act. This act would hurt his conscience, or endanger his safety, or violate his political engagements.

What does he do? He begs permission to resign; and leaves his sovereign wholly unable to procure the accomplishment of his purpose, till he can find a minister willing to undertake it. He does find one. This man, perhaps, sees nothing dishonest in the design, relies upon the innocency of his cause, or the strength of his friends, and has no engagements to be violated, or, having, dispenses with the consideration. He performs the act. It is regarded as unlawful. He is impeached, condemned, and beheaded. Has not the nation, then, full vengeance for the past, full security for the future? and has not the punishment fallen upon the true delinquent? Has he not given substance to an evil which, while in the king's breast, was bodiless? Admitting that the act was an improper one, the king is *morally* wrong; but he has no political guilt; and for this plain reason,—it was out of *his* power to commit a crime.

Change the circumstances, and suppose that it was the minister who projected this measure, and who merely obtained the king's approbation: is he not still the man upon whom the consequences should fall? Or, go farther, and say, that he has received a general commission to act in the king's name: ought he not to be the responsible man?

But, is it wholly impossible that the king can do wrong? We perceive that it is his duty to act through his ministers, and that these ministers being, as free agents, responsible for their actions, he cannot, while in his proper sphere, be charged with any crime.

To return to the king's prerogatives, and complete our view of his situation. In reading the foregoing enumeration of the powers with which the laws of England have intrusted the king, we are at a loss to reconcile them with the idea of a monarchy which, we are told, is limited. The king not only unites in himself all the branches of the executive power, he not only disposes, without control, of the whole military power in the state,—but he is moreover, it seems, master of the law itself, since he calls up, and dismisses at his will, the legislative bodies. We find him, therefore, at the first sight, invested with all the prerogatives that ever were claimed by the most absolute monarchs; and we are at a loss to find that liberty which the English seem so confident they possess.

But the representatives of the people still have, and that is saying enough, they still have, in their hands, now that the constitution is fully established, the same powerful weapon which has enabled their ancestors to establish it. It is still from their liberality alone, that the king can obtain subsidies; and in these days, when every thing is rated by pecuniary estimation, when gold is become the great moving spring of affairs, it may be safely affirmed that he who depends on the will of other men, with regard to so important an article, is, whatever his power may be in other respects, in a state of real dependence.

"This is the case with the king of England. He has, in that capacity, and without the grant of his people, scarcely any revenue. A few hereditary duties on the exportation of wool, which (since the establishment of manufactures) are become tacitly extinguished; a branch of the excise, which, under Charles the Second, was annexed to the crown as an indemnification for the military services it gave up, and which, under George the First, has been fixed to seven thousand pounds; a duty of two shillings on every ton of wine imported; the wrecks of ships of which the owners remain unknown; whales and sturgeons thrown on the coast; and a few other feudal relics, now compose the whole appropriated revenue of the king, and are all that remain of the ancient inheritance of the crown.

"The king of England, therefore, has the prerogative of commanding armies, and equipping fleets;—but without the concurrence of his parliament he cannot maintain them. He can bestow places and employments;—but without his parliament, he cannot pay the salaries attending on them. He can declare war; but without his parliament, it is impossible for him to carry it on. In a word the royal prerogative, destitute as it is of the power of imposing taxes, is like a vast body which cannot of itself accomplish its motions; or, if you please, it is like a ship completely equipped, but from which the parliament can at pleasure draw off the water, and leave it aground,—and also set it afloat again, by granting subsidies."

KING *at arms*, in heraldry, an officer of great antiquity, and, once, of great authority. His business is, to direct the heralds, and preside at their chapters; and he has the jurisdiction of armoury. In England, there are three kings of arms; *Garter*, *Clarencieux*, and *Norroy*: in Scotland, one; denominated *Lion*.

KING's-*bench*, in English polity, the supreme court of law. This court was, originally, the only one in Westminster-hall; it is the root from which the courts of common-pleas and of exchequer have arisen. It was in this court that, anciently, the kings of England sat in person; and it was, therefore, always held where the king resided. It still possesses the highest authority; the king himself, by his deputy, still sitting, in the eye of the law, upon this seat or bench, though the judicial power can only be executed by that deputy; that is, by one of the judges of the court. Formerly, the chief-justice of this court, who was styled, the *chief-justiciary of all England*, was created by letters-patent; but Edward I. ordained, that this should be done by writ: and this is the present practice.

The jurisdiction of this court is very extensive. Its justices are sovereign justices of oyer and terminer, of gaol delivery, and of eyre; supreme conservators of the peace; and coroners throughout England, some provincial jurisdictions excepted. They have cognizance of all matters of a criminal and public nature, judicially brought before them, to give remedy either by the common-law, or by statute; and their power is original and ordinary: that is, after the king has appointed them, they do not derive their jurisdiction from him, but from the law. Whatever crime is against the public good, though it does not injure any particular person, comes within the scope of the justice of this court; and no subject can suffer any kind of unlawful violence, or injury, to his person, liberty, or possessions, but he may here have a proper remedy: not only by way of satisfaction in damages, but by the exemplary punishment of the offender: for this court is considered as the guardian of the morals of all the subjects of the realm. It is in the discretion of this court, to inflict fine and imprisonment, or infamous punishment on offenders. It may commit to any prison it shall think proper; and the law allows no other court to remove or bail persons it imprisons: but this court may grant an *habeas-corpus* to relieve persons imprisoned by any other authority or means. This court can try all causes capable of coming before a jury, in many of which the king is plaintiff; but the *common-pleas*, only those between subject and subject.

Kirk, in ecclesiastical history, a Saxon word, from which, by a difference of pronunciation and orthography, is derived the modern English, *church*. The kirk of Scotland, however, is distinguished from the church of England, by particulars more important than the pronunciation of its name. This establishment is Presbyterian.

Knight, among the Romans, the title of the second order of nobility, immediately below that of senator.

Knight, in modern history, a professed warrior according to the constitutions of chivalry.

Knight *of St. Andrew*, or, *of the Thistle*, an order of knighthood in the kingdom of Scotland. The Thistle is the badge of Scotland, as the Rose is of England, and the Shamrock of Ireland; and St. Andrew is its patron or tutelar saint.—A tutelar saint, is one which a nation chuses to consider as its protector; answering to the national gods of the antients; as Minerva, the tutelar deity of Athens.

Knight *of the Garter*. See Garter.

Knight *of the Bath*. See Bath.

KNIGHT-*errant*, or *wandering Knight*, one who, in the generous enthusiasm of chivalry, set out, attended by his esquire, or shield-bearer, with the design of exposing his life, wherever wrong was to be redressed. The age in which this profession was taken up, demanded such exertions. Poetry has given an air of fiction to the adventures of knights-errant, but they are founded on truth. See CHIVALRY.

KNIGHT-*marshal*, an officer in the royal household of Great Britain and Ireland, who has jurisdiction and cognizance of offences committed within the household and verge, and of all contracts made therein, a member of the household being one of the parties.

KNIGHT *of St. Patrick*, an order of knighthood established in the kingdom of Ireland, A. D. 1783. The ceremony of installation is performed in the cathedral church of St. Patrick, in the city of Dublin. The knights of this order are twelve in number.

KNIGHT-*service*, a tenure of lands, instituted on the decline of the feodal spirit, with the view of reviving political vigour. It originally consisted in investiture of lands, upon express condition, that the person so invested should serve in the wars of his lord. This duty was subsequently compounded for, by the payment of sums of money, on various occasions; and, at length, by statute 12 Car. II. the whole was abolished.

KNIGHT *of the Shire*, a member of parliament, representing a *shire*, in contradistinction to a burgess, who represents a corporation. A knight of the shire is so called, because, as the *terms* of the writ for election still require, it was formerly necessary that he should be a knight. This restriction was coeval with the tenure of knight-service, when every man who received a knight's fee immediately of the crown was constrained to be a knight. At present, an esquire may be chosen to fill this office. A knight of the shire must be worth £500 per annum, landed income, within the shire. By law, the shire is to defray his expences; but this privilege is seldom, or never, insisted on. The electors of knights of shires must be able to expend forty shillings, out of their landed income within this county.

KNIGHTHOOD, the state or condition of a knight. The origin of knighthood will be seen in the article CHIVALRY. This institution has given rise to three others, each of which is only a deviation from itself: thus,

I. The primitive objects of chivalry, induced men to enter into intimate associations; whence sprung the several orders of knighthood. From these, by the degeneracy necessarily befalling all establishments, are derived the orders still subsisting in modern Europe.

II. The primitive dignity of chivalry, gave birth to that species of knighthood at present conferred by dubbing.

The two species here mentioned, however, are severally distinguished by historians, as *regular*, and *honorary*; of these, the first comprehend such as still adhere to their constitutions, as in requiring vows of celibacy, &c. and the second, those which are merely titular. The Teutonic order is an example of the former; the order of the Garter, of the latter.

III. The union of chivalry with the feodal system, and the decay of both, gave rise to knight-service, and the compulsion of landholders to become knights.

Knowledge, that information which the mind receives, either by its own experience, or by the testimony of others. The beneficial use of *knowledge* is *wisdom*. That portion of *knowledge*, the truth of which can be demonstrated, is *science*.

Koran, in history, a book given by Mohammed to his followers, and purporting to contain a divine revelation of the will of God concerning man. The Arabic word, *koran*, signifies *book*: *al koran*, *the book*. The principal aim of Mohammed, as a religious instructor, was the abolition of idolatry. Hence, the tenet most insisted on in the *koran*, is, that *There is no god but God*. The tenet by which men were to be invited to rally round himself as their leader, occupies the second rank in his book: *There is no god but God; and Mohammed is his prophet*.

Besides this general doctrine, the koran pretends to convey a distinct picture of the heavenly regions, the abode of good men after death; and of the punishments allotted to the wicked. Farther, it enjoins the practice of the moral virtues, and of many religious rites; of which latter, some are physically useful, and others politically so, as attaching men to its cause.

L.

L, the eleventh letter, and eighth consonant of our alphabet. It is called a semi-vowel, formed in the voice by intercepting the breath between the tip of the tongue and the fore-part of the palate with the mouth open. There is something of aspiration in its sound, and therefore the Welsh usually double it, or add an *h* to it, as in *llan*, or *lhan*, a *temple*. In English words of one syllable, it is usually doubled, as in *well*, *wall*, but in words of more than one syllable it is only single at the end, as *foretel*, *label*. As a numeral L stands for 50; L with a dash over it thus, $\bar{L}$ 50,000.

Label, in heraldry, a fillet usually placed in the middle along the chief of the coat without touching its extremities. It is adorned with pendants; and when there are above three of these, the number must be specified in blazoning. This is an addition to the arms of a second brother, and is esteemed the most honourable of all differences.

Laboratory. A laboratory properly fitted up with apparatus, is essentially necessary to a chemist whose objects lead him to make researches, experiments, and processes, upon all the different scales of operation. It is undoubtedly true that many operations can only be performed upon a scale of considerable magnitude, and that many facts of great value display themselves upon the extensive theatre of nature or in large manufactories, which are either not seen, or require uncommon discernment to perceive them in the contracted space, and during the short time employed in the performance of a philosophical experiment. But it is no less true that experiments upon a small scale do likewise possess their exclusive advantages. During the fusion and combination of substances, in the whole no larger than a pepper-corn, before the blowpipe, the effects take place with rapidity, and many of them, such as the escape of gas by effervescence, the changes of colour and transparency by differences in the heat applied, the manner of acquiring the solid state, &c. which cannot be seen in the furnace, are in the course of a few seconds remarked and ascertained. The saving of time is also an object of leading importance. The same considerations are likewise applicable to processes of fusion, or other applications of heat in a small vessel, such as a tobacco-pipe, placed in a common fire, urged by the bellows if necessary. Humid operations may also be very advantageously conducted by single drops of liquid, and small particles of solid bodies laid upon a glass plate, or in the metallic spoon; and the lamp, for distillations and other works even upon a scale of some magnitude, has long been a favourite instrument with chemists. For the mechanical division of bodies it is requisite the chemist should have the usual instruments for cutting, breaking, rasping, filing or shaving, mortars for pounding: rollers for laminating metals: a forge for many of the purposes in which the blast heat of a small fire is required, and various other tools and implements not peculiar to chemistry. Of crucibles and some other instruments we have already given an account under the article Chemical *apparatus*. We shall now describe a furnace or two which must be found in laboratories.

Fig. 1. "Air furnace." This is a section of the common furnace, used by chemists for melting or fusing substances. A is the ash-pit, where the air enters. C is the fire-place, containing a covered crucible, resting on the grate, in the midst of the fuel. D is the passage into E, the chimney. F is a flat stone or tile, to be occasionally removed in supplying fuel, or when examining the matter under experiment. When a pair of bellows is fitted into a furnace of this kind, it is sometimes called a blast furnace.

Fig. 2. In the application of heat to bodies, in chemical operations, furnaces of different forms are employed. A B C D is a kind of hollow cylindrical tower, sometimes wider at the top, with notches *m m*, to give a passage to the air. This furnace has two apertures; the upper one F, is the door of the fire-hole H I, and the lower one G, is the door of the ash-hole C D. Between these two doors there is a horizontal grate, on which to support the fuel. The space occupied by this grate, is indicated by the line drawn from H to I. This furnace is intended to receive iron or earthen retorts, for the purposes of distillation, sublimation, &c.

Fig. 3. "Reverberating furnace." H, I are the ash-holes. K L M N is the place for fuel; M N R R is called the laboratory, or the place where the materials to be acted upon by the heat, are deposited. R R S S is called the dome, and serves the purpose of reflecting or reverberating the heat and flame downwards upon the materials. T T V V is a tube for conveying the smoke or heat upwards. In the laboratory, an earthen, or iron retort, may be placed, and the neck of it will pass through the aperture O. To this furnace, bellows may also be adapted; but for the sake of procuring a greater supply of air, and consequently a greater degree of heat, there are generally two ash-holes in reverberating furnaces. These two furnaces are sometimes called portable furnaces; the common furnace, (fig. 2) when it has the dome applied to it, becomes the reverberating furnace. It is used only where an intense degree of heat is wanted.

Fig. 4. "The gazometer." Large vessels for containing air, or gas, and expelling any given quantity, are called gazometers. A B is a cylindrical vessel of tin, japanned, nearly filled with water: it has a tube C, in the middle, open at top and branching to communicate with the cock D. Within the vessel A B, there is another cylindrical vessel, generally of glass, of smaller size F, open at bottom: this is inverted and suspended by the cords e e, which go over the pullies f f f f, and have weights g g, attached to them, in order to balance the vessel F. While the cock D remains shut, if the vessel F be pressed downwards, the air included within it will remain in the same situation, on the principle of the diving bell; but if the cock be opened, and the vessel F is pressed down, the air, or gas included within it, will escape through the cock. By means of the rod h, the quantity thrown out is exactly ascertained:

this rod being so graduated, as to express the contents of the inner vessel F in cubic feet. This instrument is likewise applied to the purpose of breathing any of the gases by applying a mouth piece to the cock D.

Fig. 5. " Apparatus for the production of hydrogen gas." *x x*, is a gun-barrel, passing through a furnace F. To one extremity of it is adapted the bent tube A, and to the other extremity is fixed the tube B, which enters under the receiver C. When the apparatus is thus disposed, and the several parts are luted together, the gun barrel is made red-hot, and water is poured in drop by drop at A. The iron of the gun barrel seizes on the oxygen of the water as it passes, and the hydrogen escapes through B, into the receiver in the state of gas.

Fig. 6. Is a self-acting blow-pipe. E is a hollow globe of copper, which contains spirits of wine, and it rests on the frame g: the tube G is continued within the globe E, almost to the top, and serves for conveying the spirits in the form of vapour, or gas, to the flame O of the lamp. D F is a safety valve, occasionally forced up by the vapour, which would otherwise burst the apparatus, *x* is the stopper, by means of which the spirits are introduced. The flame of the lamp boils the spirits of wine, which come over through the tube G, in the form of gas, and being conveyed through the wick of the lamp, produces a heat strong enough to melt almost any substance.

A variety of other instruments are necessary for a complete laboratory, such as *portable* and *lamp* furnaces: chemical lamps on Argand's principle:

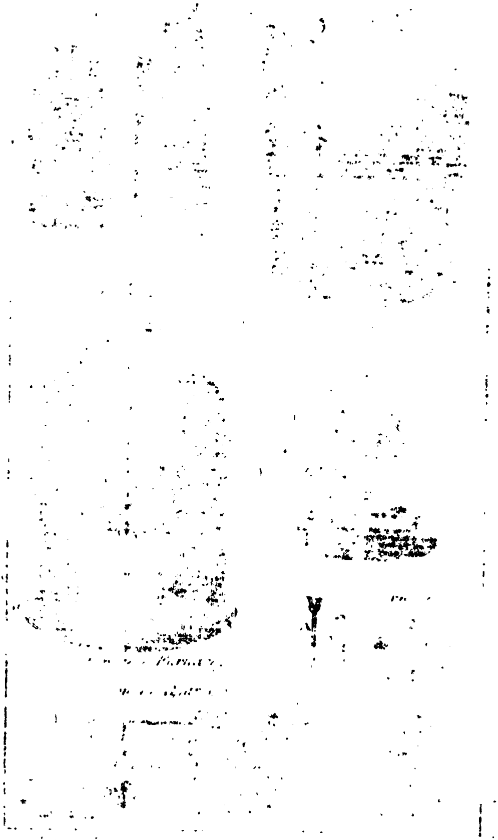

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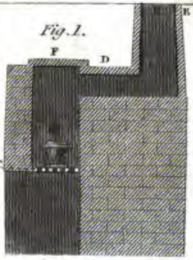
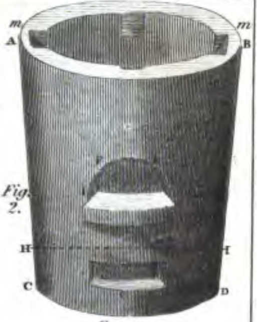
Fig. 1.



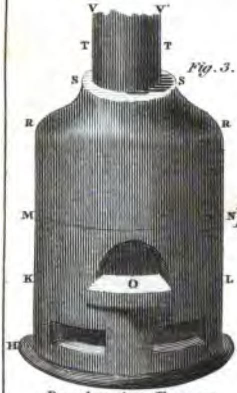
Air Furnace.

Fig. 2.



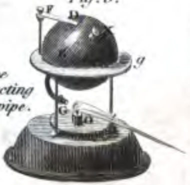
Furnace.

Fig. 3.



Reverberating Furnace.

Fig. 6.



The Self-acting Blow pipe.

Production of Hydrogen Gas.

Fig. 5.

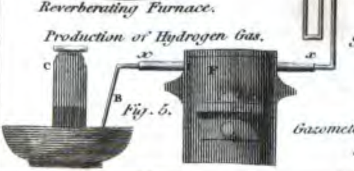
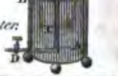


Fig. 4.



Gazometer.

Couper sculp.

Published by J. Harris, St. Pauls Ch. Yd. 1811.

glass-bells with and without stop-cocks and bladders: receivers of all sizes; porcelain tubes: leaden retorts and bottles for the fluoric acid gas: weights, and scales to turn with the least difference of weights: graduated glass measures: evaporating vessels and filtering paper: glass rods and funnels: iron ladles, and lutes of various kinds. The preparations necessary to the experiments of the young chemist are;

Metals in a state of purity.
Metallic oxydes.
Pure alkalies.
Pure acids.
Alkaline and earthy salts.

The following, which, as well as the above, may be had at any chemists, will serve for the purposes of amusement and instruction.

Preparations which take fire under the surface of water.

Oxyde of Phosphorus, for procuring light instantly, without flint, steel, or tinder.

Yellow Sympathetic Ink, which disappears and re-appears alternately.

Phosphuret of Lime, for causing fire to rise out of water.

Spoons which melt in boiling water.

Silver Powder, for silvering brass, &c.

Solution of Silver, for silvering silk, &c.

Fluoric Acid, for etching on glass.

Solution of Silver, for forming the arbor Dianæ, or silver tree.

Freezing Mixtures for producing cold.

Fluids which produce solids, and solids which produce fluids, by a mere mixture.

Labrador, a country on the east side of Hudson's bay, in North America. The climate is excessively cold in winter: but the ice begins to disappear in the month of May, and in June the sun is scorching hot. Mock suns, halos, and the auroræ boreales are very common. In summer there is a great variety of colour in the skins of animals, but in winter they all change to white. Dogs, cats, &c. carried from this country to Hudson's Bay change their appearance on the approach of winter, and are furnished with a softer and much thicker coat of hair than they originally had.

Lacca, lac, *or* **gum-lac**, a wax of which a species of insects, of the cochineal kind, forms its cells. Some of the dead insects, remaining in the combs, give the whole a red colour. That sort of lac which is called

Lac-stick, is the wax adhering to small sticks or branches, and which is unprepared. This lac, when separated from the sticks, grossly powdered, and deprived of its colour, for the sake of the dyes, and other purposes, is called

Lac-seed; when the stick-lac is freed from its impurities by melting it over a gentle fire, and formed into cakes, it is called Lamp-lac.

Lace, in commerce, a work composed of threads of gold, silver, silk, or linen, interwoven the one with the other, and worked upon a pillow with spindles, according to the pattern designed. The open work being formed with pins, which are placed and displaced as the spindles are moved.

Lace-*bone*, a lace made of fine linen thread, nearly in the same manner as that of gold and silver. The pattern of the lace is fixed upon a large round pillow; and, pins being stuck into the holes or openings in the pattern, the threads are interwoven by means of a number of *bones*, or bobbins, each of which contains a small quantity of fine thread, in such a manner as to make the lace exactly resemble the pattern. There are several towns in England, and particularly in Buckinghamshire, that carry on this manufacture; but great quantities of the finest laces are made in Flanders.

Lacerta, the lizard, a genus of amphibia of the reptile order, of which there are upwards of eighty species. The following claims principal attention. Lacerta Crocodilus, or the crocodile, is a native both in Africa and Asia, but is most frequently found in the former, inhabiting its vast rivers, and particularly the Niger and the Nile. It has occasionally been seen of the length of even thirty feet, and instances of its attaining that of twenty are by no means uncommon. It principally subsists on fish, but such is its voracity, that it seizes almost every thing within its reach. The upper part of its body is covered with a species of armour, so thick and firm, as to be scarcely penetrable by a musket ball, and the whole body exhibits the appearance of an elaborate covering of carved work. It is an oviparous animal, and its eggs scarcely exceed in size those of a goose. These eggs are regarded as luxuries by the natives of some countries of Africa, who will also with great relish partake of the flesh of the Crocodile itself.

On its native climate its power and propensity for destruction are unquestionably great, and excites in the inhabitants of the territories near its haunts, a high degree of terror. It lies in wait near the banks of rivers, and with a sudden spring, seizes any animal that approaches within its reach, swallowing it by an instantaneous effort, and then rushing back into its watery recesses, till renewed appetite stimulates the renewal of its insidious exertions. See Pl. Nat. Hist. fig. 29.

Lachrymal gland; that which secretes the tears, and conveys them to the eye by its ducts, of which there are six or eight in number.

Lack *of rupees*: in the East Indies, equal to 100,000 rupees, which are worth at the standard price 2*s.* 6*d.* each, of course the *lack* is worth £.12,500 sterling.

Lacteals, these are certain absorbent vessels which originate in the small intestines, and convey the chyle to the thoracic duct.

Lacquer, a French word, naturalized in England, and formed from *lacca*. Lacca is used in China, and Japan, as a varnish, whence various kinds of varnish, the basis of which is seed-lac, are called lacquers.

Lactic acid, a peculiar acid found in milk, upon which depends the facility with which milk undergoes the acetous fermentation. Hence **Lactats** are formed with the Lactic acid and certain bases.

Lake, in geography, or, more strictly, hydrography, a sea having no apparent communication with the ocean.

Lakes are of two classes; either temporary, or perennial.

1. Temporary lakes are formed by inundations; certain favourable tracts of ground affording a receptacle for the superfluous waters, which remain

there till evaporated. Of this order are those created by the overflowing of the Nile and the Niger, and by the rains, and melted snow, in Muscovy, Lapland, and their adjacent countries; and those which, in India, are filled by the rains of the monsoons, and only maintained throughout the year, by the industry of the inhabitants, which has surrounded their beds with stone embankments.

II. Perennial lakes are of four descriptions, 1. such as neither receive nor emit any river; 2. such as do not receive, but yet emit one river or more; 3. such as receive, but do not emit one river or more; 4. such as both receive and emit one river or more.

1. Those lakes which neither receive nor emit rivers, exist because they are supplied by springs, rising in their own beds; and emit no rivers, either because their surface is too low, with respect to the surrounding land, or their banks too high to allow their waters to escape, or because the supply of their springs does not exceed their loss by evaporation; or, because of a combination of these circumstances.

2. Lakes that receive no river, but yet emit one or more, are the waters of those which, supplied as the preceding kind, are not, like them, restrained within their banks. These lakes, which are strictly heads, or reservatories, of water, are the most ordinary. Such are the Wolga, at the head of the river Wolga; the Odium, at the head of the Tanais; the Ozero, or White lake in Muscovy, the source of the river Shacksna; the Chaamy, which emits four very large rivers, the Menan, the Asa, the Caipoumo, and the Laquia.

3. These lakes which receive rivers, but emit none, apparently owe their origin to those rivers which in their progress from their source, falling into some extensive cavity, are collected together, and form a lake of such dimensions, as may lose as much by exhalation, as it continually receives from these sources: of this kind is the Caspian sea; the lake Asphaltites, also called the Dead sea; the lake of Geneva, and several others.

4. Those which both receive and emit rivers, include some varieties, as the quantity they emit is greater, equal, or less than they receive. If it be greater, it is plain that they must be supplied by springs at the bottom; if less, the surplus of the water is probably spent in exhalations; and if it be equal, their springs just supply what is evaporated by the sun.

Lake, see Colours.

Lamentations, a canonical book of the Old Testament, generally supposed to have been written by the prophet Jeremiah: others however imagine that the book of Lamentations composed by Jeremiah is lost. The 52d chapter of the book of Jeremiah, was probably added by Ezra as an introduction to the Lamentations. The first two chapters are employed in describing the calamities of the siege of Jerusalem: in the third the author deplores the persecutions which he himself had endured: the fourth treats of the desolation of the city and temple: the fifth is a prayer for the Jews in their dispersion and captivity, and at the close the writer speaks of the cruelty of the Edomites. This book, excepting the last chapter, is written in metre, and digested in the order of the alphabet.

Lammass, *or* **lamb-mass, day,** the first of August; a festival celebrated in the Roman church, in memory of the imprisonment of St. Peter.

In former times, the tenants of the abbey of York, were bound, by their tenure, to bring into the church, a living lamb each.

The origin of this custom does not appear; but its existence clearly accounts for the name of the day.

Lamp-*black*, in painting, a pigment formed of the soot arising from burning oil. In its original state, its extreme greasiness would prevent its drying; but this defect is remedied, by burning it in a crucible.

Lampyris, in entomology, the *fire fly.*

There are eighteen species of this genus, the most remarkable of which is the *noctiluca.* The male of this insect is less than the female, which is commonly known by the name of *glow-worm.*

The glow-worm is seen about the months of June, July, and August. The light which is perceived toward the lower extremity of its body, is produced by a phosphoric liquor. The animal has the power of varying the degree of its brightness, and even of wholly extinguishing it; so that if an observer approach the spot where he has perceived it, it often happens that the creature renders itself wholly invisible. It seems probable, that it does not emit light, either when moving, or when apprehensive of danger. The lights, which are perceived along the ground, are never seen to change their places; and if the insect be taken, and carried in such a manner that it is itself at rest, it will shine during the whole journey, yet when set down, even in the dark, it will immediately withdraw its luminousness. If, in this case, a light be procured, it will be found that it is crawling in search of a station.

The glow-worm has a slight, but very slight, resemblance to the beetle kind. The upper part of its body is of a dull brown-colour, and the under of a whitish, tinged with red. Its luminousness serves the double purpose of making it discoverable to its own kind, and to the animals of which it is a prey.

Landspessades, officers in the French army between the sentinel and corporal.

Lantern-*magic*, see **Optics**.

Laocoon, is a celebrated monument of Greek sculpture executed in marble by Polydorus, Athenodorus, and Agesander, the three most celebrated artists at Rhodes. This fine remain of antiquity was found at Rome in the palace of Titus, in the beginning of the 16th century, and has since been deposited in the Farnese palace. Laocoon, the priest of Apollo, is here represented with his two sons, with two hideous serpents clinging round his body, gnawing it, and injecting its poison. The statue exhibits the most astonishing dignity and tranquillity of mind in the midst of the most excruciating torments.

Lapidary, an artificer who cuts precious stones.

There are various machines employed in the cutting of precious stones, according to their quality; the diamond, which is extremely hard, is cut on a wheel of soft steel, turned by a mill, with diamond-dust, tempered with olive-oil, which also serves to polish it.

The oriental ruby, sapphire, and topaz, are cut on a copper wheel with diamond-dust, tempered with olive-oil, and are polished on another copper wheel with tripoli and water. The hyacinth, emerald, amethysts, garnets, agates, and other stones not of an equal degree of hardness with the other, are cut on a leaden wheel with smalt and water, and polished on a tin wheel with tripoli. The turcoise of the old and new rock, girasol and opal, are cut and polished on a wooden wheel with tripoli also.

Lapland, a country of Europe, bounded on the N. by the north-sea, and the Frozen ocean, on the E. by the White sea, on the S. by Sweden, and the gulf of Bothnia; and on the W. by Norway. It is divided into three parts, viz. Swedish Lapland, which occupies the S. division of the country and is the largest: Russian Lapland on the E. and Danish Lapland, which is the smallest, on their northern side. The Laplanders are peaceable, obedient to their superiors, cheerful in company, and so much attached to their country and constitution, that when removed from the place of their nativity, they usually die of what is called the nostalgia or anxious desire of returning home.

Larceny, in law, a felonious carrying away another person's goods: and this, according to the value of the thing stolen, is either *grand*, or *petit larceny;* the first being, stealing effects above the value of one shilling; and the last, such as are either of that value, or under it: but where two persons together steal goods to the value of only thirteen pence, it is *grand larceny* in both: and if one person, at different times, steal several different things from the same person, which amount upon the whole to above twelve pence value, they may be joined in one indictment, and the offender found guilty of grand larceny; but this is very seldom practised; on the contrary, the jury, where the theft appears to be the first offence, frequently bring in their verdict, as they lawfully may, that the things are not above ten pence value, and by that means reduce the offence to petit larceny, though the offender may perhaps be indicted for stealing to the value of thirty or forty shillings and upwards. The crime of grand larceny is punishable with death; but that of petit larceny, only with corporal punishment, as whipping.

Larceny is also divided into *simple larceny*, the taking away the goods of another; *mixed*, or *complicated larceny*, which has a farther degree of guilt, as in cases of robbery, &c. *private larceny*, where the felonious taking from a person above the value of twelve pence, is felony without benefit of clergy, if it be only laid in the indictment that it was done privately and secretly; and, lastly, *open larceny*, or such as is committed with the party's knowledge, as where a thief snatches off a person's hat, and runs away with it; this is within the benefit of the clergy. A person may commit larceny, by taking away his own goods in the hands of another; as where the owner delivers goods to a carrier, or any other person, and afterwards secretly steals them, with an intent to charge him for them. If a person employ a child of six or seven years of age to take goods and bring them to him, and he carries them away, the child is not guilty of this crime on account of his infancy, but it is larceny in the other.

Larva, in natural history. The larva state of insects, in general, denotes caterpillars of all kinds. The caterpillar state is that through which every butterfly must pass before it arrives at its perfection and beauty. The change from caterpillar to butterfly was long esteemed a sort of metamorphosis, or real change of one animal into another; but this is by no means the case. The egg of a butterfly produces a butterfly, with all the lineaments of its parent; only these are not disclosed at first, but for the greater part of the animal's life they are covered with a sort of case or muscular coat, in which are legs for walking: these only suit it in this state, but its mouth takes in nourishment, which is conveyed to the included animal; and after a proper time this covering is thrown off, and the butterfly, which all the while might be discovered in it by an accurate observer with the help of a microscope, appears in its proper form. The care of all the butterfly tribe to lodge their eggs in safety is surprising. Those whose eggs are to be hatched in a few weeks, and who are to live in the caterpillar state during part of the remaining summer, always lay them on the leaves of such plants as will afford a proper nourishment; but, on the contrary, those whose eggs are to remain unhatched till the following spring, always lay them on the branches of trees and shrubs, and usually are careful to select such places as are least exposed to the rigour of the ensuing season, and frequently cover them from it in an artful manner.

Lath, in building, a long thin, and narrow slip of wood, nailed to the rafters of a roof or ceiling, in order to sustain the covering.

Laths, *cleaving of.* The lath-cleavers having cut their timbers into lengths, they cleave each piece with wedges, into eight, twelve, or sixteen, according to the size of their timber; these pieces are called bolts; this is done by the felt-grain, which is that grain which is seen to run round in rings at the end of a piece of a tree. Thus they are cut out for the breadth of the laths, and this work is called felting. Afterwards they cleave the laths into their proper thicknesses with their chit, by the quarter-grain, which is that which runs in a straight line towards the pith.

Latitude, in geography, is the distance of any place from the equator, measured in degrees, minutes, and seconds, upon the meridian of that place; and is either north or south, according as the place is situated either on the north or south side of the equator.

Latten, among manufactures, iron plates, tinned over. See Tin.

Law, a rule of action; whether the action be performed by a thing animate or inanimate: thus, we say, *law of gravity*, as well as *law of nations.* The first division, therefore, of the compound idea of *law*, is into I. *mechanical law*, and II. *moral law;* the first comprehending the irresistible ordinations of nature; the second, prescriptions, in cases where several modes of action are equally possible.

I. The first class of laws are the objects of *physics*.

II. The second, comprehends what is commonly called *law;* that is, the rule of moral conduct.

Laws are subdivided into several orders: 1. ethics, or the law of nature; 2. divine law, or the law of revelation; 3. law of nations; 4. municipal law.

1. The "law of nature," otherwise called ethics, or morals, comprehends those rules of right and wrong, of which the sentiment is in every man's breast, and of the justice of which reflection affords sufficient conviction.

2. The divine, or revealed law, is that which, not being naturally felt, nor discovered by reflection, is found only in inspired writings.

3. The "law of nations" is that rule of conduct which nations are to observe toward each other. This is founded upon the law of nature; but either ascertained or modified by usage, or by mutual compacts.

4. "Municipal law" is, again, that which is most usually spoken of under the simple term of *law*. It includes whatever belongs to the internal government of a nation. Municipal law is either *criminal*, or *civil*; *criminal*, wherein it prescribes punishments for offenders; *civil*, wherein it prescribes rules for determining disputes on property. Municipal law also comprehends several inferior branches, adapted to specific occasions. The term is, also, occasionally confined to the peculiar laws of a single city; and this is its original meaning.

Law, to be just, must be *prescribed*; that is, it must be fixed, and published, before the act to which it relates has taken place.

Municipal law of England, a body of law, divided into various parts, according to the foundations upon which it stands, or the affairs it is adapted to regulate.

1. Of these parts, the first is the common law. See COMMON.

2. The second, the statut e, or written law, or

that which is ordained by the statutes of the king and parliament.

3. The third, the civil law. [See CIVIL.]

Within these three sections are comprized the subdivisions of crown-law; ecclesiastical, or canon, law; forest-law; the law of marque and reprisals; the law of merchants; martial-law; &c.

LAWYER, a general term for persons conversant in the law; including attorneys and solicitors, who conduct suits; counsellors, who give advice; barristers, who plead at the bar; serjeants, a superior order of barristers; and judges, who preside on the bench.

LAYMAN, in law, every one who is not an ecclesiastic.

LEAD, in mineralogy, a metal usually found combined with other substances, but which has been met with in a native state in Monmouthshire, in Wales, and in more than one part of France.

Lead, which is of a dull white colour, inclining to blue, is very malleable, but imperfectly ductile; a wire formed of it, the tenth of an inch in diameter, not being able to sustain a weight exceeding twenty-nine pounds and an half.

Lead, while in the earth, enters into the substance of crystal. This is frequently the case with that crystal which is found about lead-mines, the figure of which it renders a cube. It often does this without altering the colour; but when it tinges likewise, the tint it gives is yellow.

The topaz, among the gems, owes its yellow colour to this metal; and, in the factitious gems, the tint it gives to the composition is always a yellow approaching to that of the topaz.

Lead ore is readily known to be such, by its being nearly of the colour of lead itself, or a little darker; very bright and glossy when fresh broken; and composed either of cubic or parallelopiped masses, or of smaller granules, or else of striæ, or chamfered, or furrowed, pieces: in the first of these states it is commonly called porter's-ore, or diced lead-ore; in the second, steel-grained-ore; and in the third, antimoniated-ore, from its resemblance to antimony.

Lead, *Black*, or *plumbago*, a natural composition of iron and carbon. See Steel.

Lead, *White oxyd of*, formerly called *ceruss*, and *white-lead*, a powder formed by the union of lead with oxygen; as, when the metal is made to effervesce with the nitric acid.

Lead, *Red oxyd of*, formerly called *minium*, or *red-lead*, a composition of eighty-eight parts of lead, and twelve of oxygen.

Lead, *Yellow oxyd of*, formerly called *massicot*. When lead is exposed to heat, in contact with the atmosphere, its surface is speedily covered with a grey pellicle. This pellicle, which is composed of lead, and the oxygen it has attracted from the atmosphere, is a dirty-grey powder. If this powder be heated red-hot, it assumes a deep yellow colour; if the heat be continued, a red.

Leap Year, the same with bissextile year. See Year.

Lease, in law, an instrument or agreement, by which, under certain conditions, and particularly the payment of a rent, lands, tenements, or hereditaments are let, by the lessor, to the lessee, for a specified time. The time may be either positive or conditional, that is, for a year or certain number of years; or for the space of the life of some one person, or more. Any one of the conditions of a lease not being complied with, the proprietor may reassume possession.

The purchaser of a lease may be considered as the purchaser of an annuity equal to the rack-rent, for whether he possesses the estate himself, or lets it out to another, he has an interest in the same equal to the annual rent thereof; therefore, from the principles, on which the present value of annuities is ascertained, the value of leases is likewise found. When a certain sum is paid down for the grant of a lease, it may be considered as so much money paid in advance for the annual rents as they may become due; therefore, in order to ascertain what the sum ought to be, it would be necessary to find, separately, the present value of each annual rent, or the sum which, put out to interest at the given rate, would amount to the rent at the time it became due; and these separate values of each year's rent added together would give the sum to be paid down as the present value of the lease. The rate of interest at which money is supposed to be improveable, affects the value of leases very materially; as the higher the current rate of interest is, the less will any one be disposed to give for payments to be received at future periods: thus if 6 per cent. interest can be readily obtained for money, no one will give the same sum for a certain yearly rent as if he could only make 4 per cent. interest of his money. The value of leases at 5 per cent. is found by the table given p. 160, in Compound Interest, thus the value of a lease for 14 years of a farm worth 300*l.* per ann. is by that table 9·898 × 300 = 2969·4 = 2969*l.* 8*s.*

Leases are generally calculated at a higher rate of interest, we shall therefore insert the following

TABLE,

Shewing the number of years purchase that ought to be given for a lease, for any number of years, not exceeding 100, at 6 and 8 per cent. interest.

Yrs	6 per C.	8 per C.	Yrs.	6 per C.	8 per C.
1	·943	·925	26	13·003	10·809
2	1·833	1·783	27	13·210	10·935
3	2·673	2·577	28	13·406	11·051
4	3·465	3·312	29	13·590	11.158
5	4·212	3·992	30	13·764	11·257
6	4·917	4·622	31	13·929	11·349
7	5·582	5·206	32	14·084	11·434
8	6·209	5·746	33	14·230	11·513
9	6·801	6·246	34	14·368	11·586
10	7·360	6·710	35	14·498	11·654
11	7·886	7·138	36	14·620	11·717
12	8·383	7·536	37	14·736	11·775
13	8·852	7·903	38	14·846	11·828
14	9·294	8·244	39	14·949	11·878
15	9·712	8·559	40	15·046	11·924
16	10·105	8·851	41	15·138	11·967
17	10·477	9·121	42	15·224	12·006
18	10·827	9·371	43	15·306	12·043
19	11·153	9·603	44	15·383	12·077
20	11·469	9·818	45	15·455	12·108
21	11·764	10·016	46	15·524	12·137
22	12·041	10·200	47	15·589	12·164
23	12·303	10·371	48	15·650	12·189
24	12·550	10·528	49	15·707	12·212
25	12·783	10·674	50	15·761	12·233

Yrs.	6 per C.	8 per C.	Yrs.	6 per C.	8 per C.
51	15·813	12·253	76	16·467	12·463
52	15·861	12·271	77	16·479	12·466
53	15·906	12·288	78	16·489	12·469
54	15·949	12·304	79	16·499	12·471
55	15·990	12·318	80	16·509	12·473
56	16·028	12·332	81	16·518	12·475
57	16·064	12·344	82	16·526	12·477
58	16·098	12·356	83	16·534	12·478
59	16·131	12·366	84	16·541	12·480
60	16·161	12·376	85	16·548	12·481
61	16·190	12·385	86	16·555	12·483
62	16.217	12·394	87	16·561	12·484
63	16·242	12·402	88	16·567	12·485
64	16·256	12·409	89	16·573	12·486
65	16·289	12·415	90	16·578	12·487
66	16·310	12·422	91	16·583	12·488
67	16·330	12·427	92	16·588	12·489
68	16.349	12·433	93	16·592	12·490
69	16·367	12·438	94	16·596	12·490
70	16·384	12·442	95	16·600	12·491
71	16·400	12·447	96	16·604	12·492
72	16·415	12·450	97	16·608	12·492
73	16·429	12·454	98	16·611	12·493
74	16·443	12·457	99	16·614	12·493
75	16·455	12·461	100	16·617	12·494

To find the sum that ought to be given for a lease.

Rule. Look in the table against the number of years for which the lease is to continue, and on the line even with it, under the given rate of interest, is the number of years purchase that ought to be given for the same.

Ex. What sum ought to be given for the lease of an estate of 17 years, of the clear annual rent of 75*l.*, allowing the purchaser to make 6 per cent. interest of his money?

Answer, 10·477 × 75 = 785*l.* 15*s.* 6*d.*

This sum of 785*l.* 15*s.* 6*d.* put out to compound interest at the rate of 6 per cent., will produce a clear income of 75*l.* per annum for 17 years: consequently, if it be agreed that 6 per cent. is the proper interest, then the landlord has a full equivalent for his grant.

To find the annual rent corresponding to any given sum paid for a lease.

Rule. Divide the sum paid for the lease by the number of years purchase that are found against the given term, and under the rate of interest intended to be made of the purchase money, the quotient will be the annual rent required.

Ex. I am asked 1500*l.* for a 40 years lease, to what annual rent is that equivalent, allowing 6 per cent. for money?

$$\text{Answer, } - \frac{1500}{15 \cdot 046} = 99l.\ 13s.\ 11\tfrac{1}{4}d.$$

To find the number of years purchase given for a lease that cost a certain sum of money.

Rule. Divide the sum paid for the lease by the clear annual rent of the estate for which it is given, and the quotient will be the number of years purchase required.

Ex. The lease of a house, at the clear annual rent of 116*l.* was sold for 1630*l.*, what number of years purchase was given for it?

$$\frac{1630}{116} = 14 \text{ yrs. } 0 \text{ mo. } 2 \text{ weeks, } 4 \text{ days.}$$

Leather, the skin of several sorts of beasts dressed and prepared for the use of the various manufacturers, whose business it is to make them up. The butcher and others, who flay off their hides or skin, dispose of them raw or salted to the tanner and tawyer, and they to the shamoy, morocco, and other kind of leather-dressers, who prepare them according to their respective arts, in order to dispose of them among the curriers, glovers, harness-makers, coach-makers, saddlers, breeches-makers, gilt leather-makers, chair-makers, shoe-makers, book-binders, and all in any way concerned in the article of leather.

Lemons, salt of, used to remove ink-stains from linen, is the native salt of sorrel, the super-oxalate of potash. The effect is produced by the oxalic acid dissolving with facility the oxide of iron in the ink, on the combination of which with the tannin and gallic acid the colour depends; while, at the same time, it can be used without any risk of injury to the cloth, on which it has no effect.

Lens, in dioptrics, properly signifies a small roundish glass, of the figure of a lentil, but is extended to any optic glass, not very thick, which either collects the rays of light into a point, in their passage through it, or disperses them further apart, according to the laws of refraction.

Lepidoptera, or scaly-winged, the third order of insects, according to the Linnæan system. The general character of this order is four wings, covered with fine, imbricate scales; tongue involute, spiral; body hairy. It consists of the insects commonly termed butterflies and moths. The powder on the wings of these insects has been generally described by microscopical writers, as consisting of small feathers; but they are more in the form of minute scales, of various shapes and sizes, on the different species, and even on the different parts of the same animal. Their usual appearance is more or less fan-shaped, and they are disposed in the manner of tiles on a roof, lapping over each other.

Lepus, *the hare*, a genus of the mammalia of the order glires, of which there are 15 species. Lepus timidus deserves the principal notice. It subsists on a great variety of vegetables, particularly those which possess milky qualities; the bark of young trees, and their tender shoots, are likewise often taken by them for food. It produces generally three young ones at a time, and breeds at least three times in a year. The hare seldom quits its seat, or form, as it is called, during the day, unless compelled by the approach of enemies; but takes its range for food and excursion by night, always returning, it is said, to her habitation by the same track by which it was left. In this form it will sometimes suffer itself to be approached so nearly, as to be almost trodden upon before it starts for escape; the first advances of the enemy having probably not attracted its attention, and those which immediately followed, being attended by a species of fascination, or prostration of energy, the frequent effect of terror, till, at length, the imminence of its danger rouses every nerve and muscle to exertions which enable it to leave its enemies at a considerable distance. Its fleetness is such as to give it the advantage over many of its numerous adversaries. Its quickness of hearing, and comprehension of sight, by which last it receives the impressions of objects on almost every side, are also important means of its protection. See Plate Nat. Hist. fig. 30.

LETTER, a character used to express a modulation of the voice. Grammarians distinguish letters into vowels, consonants, mutes, liquids, dipthongs, and characteristics. They are divided into labial, dental, guttural, and palatal, and into capital and small letters. They are also denominated from the shape and turn of the letters; and in writing are distinguished into different hands, as round-text, German-text, round-hand, Italian, &c. and in printing into Roman, *italic*, and black letter. The term letter, or type, among printers, not only includes the CAPITALS, SMALL CAPITALS, and small letters, but all the points, figures, and other marks, cast and used in printing; and also the large ornamental letters, cut in wood or metal, which took place of the illumined letters used in manuscripts. The letters used in printing are cast at the ends of small pieces of metal, about three quarters of an inch in length; and the letter being not indented, but raised, easily gives the impression, when, after being blacked with a glutinous ink, paper is closely pressed upon it.

LETTER-*foundery*. See FOUNDERY.

LETTER, *Sunday*. See DOMINICAL.

LETTER *of attorney*, in law, is a letter by which one person authorises another to do some lawful act in his stead, as to give seisin of lands, to receive debts, or to sue a third person. The nature of this instrument is, to transfer to the person to whom it is given, the whole power of the maker, to enable him to accomplish the act intended to be performed. It is either general, or special; and sometimes made revocable, which is, when a bare authority is only given; and sometimes it is irrevocable, as where debts, &c. are assigned from one person to another. It is generally held, that the power granted to the attorney must be strictly pursued; and that where it is made to three persons, two cannot execute it. In most cases, the power given by a letter of attorney determines, or ceases, upon the death of the person who gave it. No letter of attorney made by any seaman, or other person, in any ship of war, or vessel, having letters of marque, or by his executors, &c. in order to impower any person to receive any shares of prizes, or bounty-money, is valid, unless the same be made revocable, and for the use of such seamen, and be signed and executed before, and attested by, the captain and one other of the signing officers of the ship, or the mayor or chief magistrate of some corporation.

Letters-*clause*, or *close letters*, are opposed to letters-patent, because they are commonly sealed with the king's signet, or privy seal, while letters-patent are left open.

Letters *of credit*, among merchants, is a letter written by a merchant or banker, to his correspondent abroad, requesting him to credit the bearer as far as a certain sum.

Letter *of licence*, an instrument or writing granted by a person's creditors, allowing him a certain time for the payment of his debts; by which means he is enabled to prosecute his business, without fearing an arrest.

Letter *of mart*, or *marque*, a letter granted to one of the king's subjects, under the privy seal, impowering him to make reprisals for what was formerly taken from him by the subjects of another state, contrary to the law of mart.

Letters-*patent*, or *overt*, are writings sealed with the great seal of England; so called, because they are open with the seal affixed to them. These are granted to authorise a man to do, or enjoy, what of himself he could not do or enjoy.

Levant, a name given to the east part of the Mediterranean sea, bounded by Natolia, or the lesser Asia, on the north, by Syria and Palestine on the east, by Egypt and Barca on the south, and by the island of Candia, and the other part of the Mediterranean, on the west. The French word *Levant*, alludes to the rising of the sun.

Levant, or *Turkey*, *Company*, a trading company erected in the reign of Elizabeth, and the privileges of which were enlarged and confirmed by James I. It was invested with an exclusive trade to the *Levant*, or *eastern* part of the Mediterranean; but this commerce is now open to all merchants, on the payment of a small consideration.

Level, an instrument wherewith to draw a line parallel to the horizon, by means of which the true level, or the difference of ascent or descent between several places, may be found, for conveying water, and other purposes.

Levelling, the art of finding a line parallel to the horizon at one or more stations, in order to determine the height of one place with regard to another.

A truly level surface is a segment of a spherical surface, which is concentric to the globe of the earth. A true line of level is an arch of a great circle, which is imagined to be described upon a truly level surface. The apparent level is a straight line drawn as a tangent to an arch or line of true level. Every point of the apparent level, except the point of contact, is higher than the true level.

Leyden *phial* or *jar*. See **Electricity**.

Libellula, or *dragon-fly*, a genus of insects of the order neuroptera, of which there are sixty species. The whole tribe of the libellula are remarkable for being very ravenous: they are usually found hovering over stagnant waters, and may in the middle of the day be observed flying with great rapidity in pursuit of the smaller insects. These brilliant and beautiful creatures were once, and for a considerable time, inhabitants of the water: in that state, as larvæ, they are six-footed and very active. The Libellula varia, or great variegated libellula, which makes its appearance towards the decline of summer, is an animal of singular beauty. The female drops her eggs in the water, which on account of their specific gravity fall to the bottom; after a certain period they are hatched into larvæ. In the larva and pupa state they remain full two years, and when they have attained their size they prepare for their ultimate change, and creeping up the stem of some water plant, they make a sudden effort, by which the skin of the back and head is forced open, and the enclosed libellula emerges. This process is always performed in a morning and during a bright sun-shine. In this and the other species of the libellula tribe, the structure of the eye is deserving of notice. According to Lewenhoek there are more than 12,000 lenses in each eye of this animal. See Plate Nat. Hist. fig. 31.

Liberal arts, arts, to the perfection of which the mind principally contributes: thus, architecture is a liberal art; *building*, otherwise.

The principal *liberal arts*, are poetry, painting, music, grammar, rhetoric, and architecture.

Science differs from art, inasmuch as the first is the work of the mind, and the second the work of the hands. In *science*, the hands may assist the mind; and in *art*, the mind the hands; but surely it is not difficult to distinguish between the operations that severally belong to these two faculties of man.

Liberty, is said to be a power to do as one thinks fit, unless restrained by the law of the land: liberty is the gift of God to man in his creation, and it is said that upon this account the laws of England generally favour liberty. Natural liberty consists properly in a power of acting as one thinks fit without any constraint or controul, unless by the law of nature. But every man, when he enters into society, gives up a part of his natural liberty as the price of so valuable a purchase; and in consideration of receiving the advantages of mutual commerce, obliges himself to conform to those laws which the community has thought proper to establish. This species of legal obedience is infinitely more desirable than that wild savage liberty which is sacrificed to obtain it. Political or civil liberty, then, is no other than natural liberty, so far restrained by humane laws, and no farther than is necessary and expedient for the general advantage of the public. See Charta, *magna*.

Libration, in astronomy, an apparent irregularity of the moon's motion whereby she seems to librate about her axis; so that the parts in the western limb or margin of the moon sometimes

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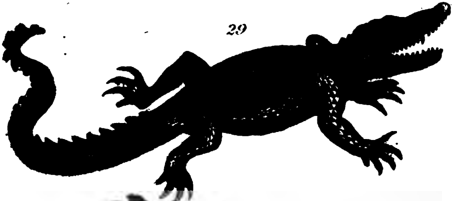

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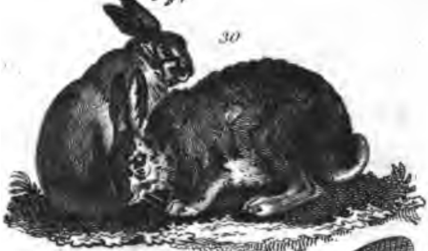

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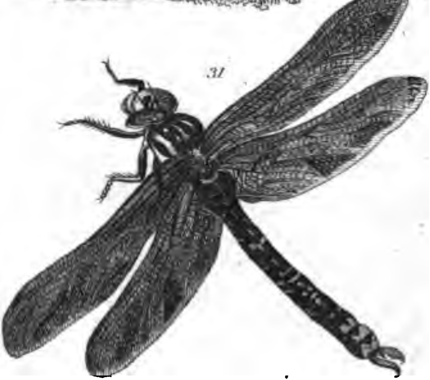

Cooper sculp.

Fig. 29. **Lacerta** *Crocodilus: Crocodile.*
Fig. 30. **Lepus** *timidus: Male & Female Hares.*
Fig. 31. **Libellula** *varia: Dragon Fly.*

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recede from the centre to the disc, and sometimes move towards it, by which means they become alternately visible and invisible to the inhabitants of the earth.

Lieutenant, an officer who supplies the place, and discharges the office, of a superior in his absence. Of these, some are civil, as the lords-lieutenants of kingdoms, and the lords-lieutenants of counties; and others are military, as the lieutenant-general, lieutenant-general of the artillery, lieutenant-colonel, lieutenant of the artillery of the Tower, lieutenants of horse, foot, or of ships of war.

Lieutenant, *lord, of Ireland*, is properly a viceroy, and has all the state and grandeur of a king of England, except being served upon the knee. He has the power of bestowing certain offices under the government, of dubbing knights, and of pardoning all crimes except high treason; he used also to call and prorogue the parliament, but no bill could pass without the royal assent. He was assisted in his government by a privy-council; and, on his leaving the kingdom, he appointed the lords of the regency, who governed in his absence.

Lieutenants, *lords, of counties*, are officers, who, upon any invasion or rebellion, have power to raise the militia, and to give commissions to colonels and other officers, to arm and form them into regiments, troops, and companies. Under the lords-lieutenants are deputy-lieutenants, who have the same power; these are chosen by the lords-lieutenants, out of the principal gentlemen of each county, and presented to the king for his approbation.

Lieutenant-*general*, is an officer next in rank to the general; in battle, he commands one of the wings; in a march, a detachment, or a flying camp; at a siege, or in one of the attacks, a quarter, when it is his day of duty.

LIFE, is peculiarly used to denote the animated state of living creatures, or the time that the union of their soul and body lasts.

LIFE, *duration of.* As the property or income from which many persons derive their subsistence depends on the continuance of their life, or that of others, cases will frequently occur in which it will be desirable to be able to form an estimate of the duration of life. Our knowledge on this head must be referred to probability only. According to De Moivre the expectation of life to persons not very young nor very old is found by the following rule.

"Subtract the given age from 86 and divide the remainder by 2, the quotient gives the number of years that such a person has an equal chance of living:" thus a person 40 years of age has an equal chance of living 23 years, because $\frac{86-40}{2} = 23$. For it is known by accurate observation, that of 46 persons aged 40 years, one will die every year, till they are all dead in 46 years; therefore half 46, or 23 years, will be the expectation of life of a person 40 years of age. That is, the number of years enjoyed by them all, will be just the same as if every one of them had lived 23 years, and then died. The same reasoning applies to all other ages.

As this rule is not equally just with regard to all ages, tables have been calculated with the nicest accuracy, shewing at first sight the expectation of human life at all ages; upon which are deduced the doctrine and value of life annuities. The following table will shew

THE EXPECTATION OF HUMAN LIFE AT EVERY AGE.

Age	Expectation.	Age.	Expectation.	Age.	Expectation.	Age.	Expectation.
0	25,18	25	30,85	50	17,99	75	6,54
1	32,74	26	30,33	51	17,50	76	6,18
2	37,79	27	29,82	52	17,02	77	5,83
3	39,55	28	29,30	53	16,54	78	5,48
4	40,58	29	28,79	54	16,06	79	5,11
5	40,84	30	28,27	55	15,58	80	4,75
6	42,07	31	27,76	56	15,10	81	4,41
7	41,03	32	27,24	57	14,63	82	4,09
8	40,79	33	26,72	58	14,15	83	3,80
9	40,36	34	26,20	59	13,68	84	3,58
10	39,78	35	25,68	60	13,21	85	3,37
11	39,14	36	25,16	61	12,75	86	3,19
12	38,49	37	24,64	62	12,28	87	3,01
13	37,83	38	24,12	63	11,81	88	2,86
14	37,17	39	23,60	64	11,35	89	2,66
15	36,51	40	23,08	65	10,88	90	2,41
16	35,85	41	22,56	66	10,42	91	2,09
17	35,20	42	22,04	67	9,96	92	1,75
18	34,58	43	21,54	68	9,50	93	1,37
19	33,99	44	21,03	69	9,05	94	1,05
20	33,43	45	20,52	70	8,60	95	0,75
21	32,90	46	20,02	71	8,17	96	0,50
22	32,39	47	19,51	72	7,74		
23	31,88	48	19,00	73	7,33		
24	31,36	49	18,49	74	6,92		

To find the expectation of any given life.

RULE. "Seek in the table the given age, and opposite to it is the expectation."

Thus, the chance of life to an infant just born is 25.18, or rather more than 25 years; to a person of 40 years of age 23.08, as we have found before, and to a person of 69, just 9 years.

LIFE *Annuities*, are annual payments to continue during any life or lives. These are generally purchased or sold for a present sum of money.

"The present value of a life annuity" is the sum that would be sufficient (allowing for the chance of life failing, which has been considered in the preceding pages) to pay the annuity without loss.

If money bore no interest, the value of an annuity of 1*l.* would be equal to the expectation of life. Thus by the foregoing table, the value of an annuity for a life of 20 years of age, if money bore no interest, would be equal to nearly 33 years and a half purchase; that is, 33*l.* 10*s.* in hand for each life, would be sufficient to pay to any number of such lives 1*l.* per annum.

If money is capable of being improved by being put out to interest, the sum just mentioned would be more than the value, because it would be more than sufficient to pay the annuity; and it will be as much more than sufficient as the interest is greater. As an example,

If money can be improved at 5 per cent. compound interest, the half of 33*l.* 10*s.* or 16*l.* 15*s.* will, in little more than 14 years, produce the 33*l.* 10*s.* required. See INTEREST, Compound.

It must not however be supposed, that 16*l.* 15*s.* is the true value of an annuity of 1*l.* during a life of 20. The value of an annuity certain for a term equal to the expectation, always exceeds the true value, because, in a number of life annuities, many of the payments would not be to be made till a much more remote period than the term equal to the expectation.

Upon this principle the following table is computed, from which it appears that the present value of an annuity of 1*l.* on a life of 20 years of age, is equal to 14*l.* and a small fraction only; that is, 14*l.* in hand for each life, improved at compound interest, will be sufficient to pay to any number of such lives 1*l.* per annum.

TABLE I.

Shewing the Value of an Annuity of 1*l.* on a Single Life, at every Age, according to the probabilities of the Duration of Human Life at Northampton, reckoning interest at 5 per cent.

Ages.	Value.	Age	Value.	Age	Value.	Age	Value.
Birth	8.863	25	13.567	50	10.269	75	4.744
1 year	11.563	26	13.473	51	10.097	76	4.511
2	13.420	27	13.377	52	9.925	77	4.277
3	14.135	28	13.278	53	9.741	78	4.035
4	14.613	29	13.177	54	9.567	79	3.776
5	14.827	30	13.072	55	9.882	80	3.515
6	15.041	31	12.965	56	9.193	81	3.263
7	15.166	32	12.854	57	8.999	82	3.020
8	15.226	33	12.740	58	8.801	83	2.797
9	15.210	34	12.623	59	8.599	84	2.627
10	15.139	35	12.502	60	8.392	85	2.471
11	15.043	36	12.377	61	8.181	86	2.328
12	14.937	37	12.249	62	7.966	87	2.193
13	14.826	38	12.116	63	7.742	88	2.080
14	14.710	39	11.979	64	7.514	89	1.924
15	14.588	40	11.837	65	7.276	90	1.723
16	14.460	41	11.695	66	7.034	91	1.447
17	14.334	42	11.551	67	6.787	92	1.153
18	14.217	43	11.407	68	6.536	93	0.816
19	14.108	44	11.258	69	6.291	94	0.524
20	14.007	45	11.105	70	6.023	95	0.238
21	13.917	46	10.947	71	5.764	96	0.000
22	13.853	47	10.784	72	5.504		
23	13.746	48	10.616	73	5.245		
24	13.658	49	10.443	74	4.990		

TABLE II.

Shewing the Value of an Annuity during the joint continuance of Two Lives, according to the probabilities of life at Northampton, reckoning interest at 5 per cent, beginning at the age of 10 and ending with that of 60.

Ages.	Value.	Ages.	Value.	Ages.	Value.	Ages.	Value.
10-10	12.665	15-75	4.495	30-30	10.255	40-70	5.298
10-15	12.302	15-80	3.372	30-35	9.954	40-75	4.272
10-20	11.906	20-20	11.232	30-40	9.576	40-80	3.236
10-25	11.627	20-25	10.989	30-45	9.135	45-45	8.312
10-30	11.304	20-30	10.707	30-50	8.596	45-50	7.891
10-35	10.916	20-35	10.363	30-55	7.999	45-55	7.411
10-40	10.442	20-40	9.937	30-60	7.292	45-60	6.822
10-45	9.900	20-45	9.448	30-65	6.447	45-65	6.094
10-50	9.260	20-50	8.861	30-70	5.442	45-70	5.195
10.55	8.560	20 55	8.216	30-75	4.365	45-75	4.206
10-60	7.750	20-60	7.467	30-80	3.290	45-80	3.197
10-65	6.803	20-65	6.576	35-35	9.680	50-50	7.522
10-70	5.700	20-70	5.532	35-40	9.331	50-55	7.093
10-75	4.522	20-75	4.424	35-45	8.921	50-60	6.568
10 80	3.395	20-80	3.325	35-50	8.415	50-65	5.897
15-15	11.960	25-25	10.764	35-55	7.849	50-70	5.054
15-20	11.585	25-30	10.499	35-60	7.174	50-75	4.112
15-25	11.324	25-35	10.175	35-65	6.360	50-80	3.140
15-30	11.021	25-40	9.771	35-70	5.382	55-55	6.739
15-35	10.655	25-45	9.301	35-75	4.327	55-60	6.272
15 40	10.205	25-50	8.739	35-80	3.268	55-65	5.671
15-45	9.690	25-55	8.116	40-40	9.016	55-70	4.893
15-50	9.076	25-60	7.383	40-45	8.643	55-75	4.006
15-55	8.403	25-65	6.515	40-50	8.171	55-80	3.076
15-60	7 622	25-70	5.439	40-55	7.654	60-60	5.888
13-65	6.705	25-75	4.396	40-60	7.015		
15-70	5.631	25-80	3.308	40-65	6.240		

Application of the foregoing Tables.

Table I.

To find the value of an annuity for a person of any given age.

RULE. "Multiply the number in the table against the given age, by the sum, and the product is the answer."

Ex. What should a person, aged 45, give to purchase an annuity of *60l.* per annum during life, interest being reckoned 5 per cent.?

The value in the table against 45 years is 11.105, and this multiplied by 60 gives the answer, *666l. 6s.*

Table II.

To find the value of an annuity on the longest of two single lives.

Rule. "From the sum of the values of the single lives subtract the value of their joint continuance, and the remainder will give the value of the longest of the lives."

Ex. What is the value of the longest of two lives aged 10 and 15?

Table I.	The value of a life at - 10 =	15.139
	- - - - - - - - 15 =	14.588
		29.727
Table II.	The value of the joint continuance of two lives of 10 & 15 =	12.302
	Value of the longest of the two lives - - - - - -	17.425

Therefore an annuity of *100l.* a year upon the longest of two lives, one 10 and the other 15, would be worth nearly 17 years and a half purchase, or more accurately, 1742*l.* 10*s.*

Upon similar principles the value of the longest of three lives, &c. is found: and all other questions, relating to annuities, are likewise solved. See REVERSIONS.

LIGHT, in physics, that substance, of the presence of which we are informed by the sensibility of the visual organs; from which bodies receive their colours; and which is, in some way, connected with heat.

Light is an object of research, both in optics and in chemistry; the first inquires into its form and laws; the second, its essence.

I. "Of light, in optics." Light, according to the Newtonian doctrine, which no subsequent discovery or theory seems to have discredited, is composed of inconceivably small particles of matter, of different magnitudes; which are emitted or reflected from every point in the surface of a luminous body, in right lines, and in all directions, with an unparalleled velocity; and whose power or intensity decreases as the squares of the distance increase.

That light is a material substance, appears from its being propagated in time, and from its acting upon and producing great alterations in other bodies; but that its particles are inconceivably small appears from this, that the greatest quantity of flame is found to have scarce any sensible gravity or weight: also because these particles pervade the pores of all transparent bodies, however hard or heavy: yet, small as they are, the rays of light consist of different sorts of these particles; and that this difference arises from their different magnitudes, seems evident from the different directions in which the several sorts of rays move, after they have passed through a body of glass, water, &c. of some special figure, especially that of a prism.

Since the weight of bodies is proportional to the quantity of matter, it follows, that, where the latter is diminished indefinitely, the former will be so too; therefore the weight of light must be imperceptible. Boerhaave caused a globe of iron, twelve inches in diameter, to be heated red-hot, and suspended at the end of a very exact balance, and nicely counterpoised by weights at the other end, and thus let it hang till all the particles of heat or light were escaped, when he found the equilibre of the balance in no wise altered.

That the particles of light have not only magnitude, but, also, in different degrees, is another, and perhaps the most subtil, discovery of the Newtonian philosophy. This is absolutely proved by the different refrangibility they are found to display in passing through a prismatic figure of glass or water; for the power of the prism detains the issuing particle, and draws it a little towards the surface; and, since this power is the same, it would have the same effect on all the particles of light, if they were all of an equal magnitude, because they have all an equal velocity. But since this effect is different among the particles, some being detained and drawn aside to a greater distance than others, it follows, they must be less in magnitude, to become more subject to the influence of the attracting surface; in like manner as the electric effluvia will act upon and agitate very small and light bodies much sooner, and more easily, than they can move those which are larger.

According to some very elaborate experiments of Dr. Bradley, light moves at the rate of one hundred and ninety-five thousand two hundred and eighteen miles in a second. Another account states the number of miles at one hundred and seventy thousand. The velocity of light exceeds that of a cannon-ball by one million five hundred and fifty thousand times. It is calculated to travel from the sun to the earth in eight minutes and thirteen seconds.

II. "Of light, in chemistry." Light is considered, by modern chemists, and apparently with reason, as a simple elementary body; but they have not yet been able to form a theory on this subject, in which considerable difficulties are not involved.

Light manifests itself to the mind through the mediums of two senses. To the organs of vision it presents forms and colours; and to those of touch, the phenomenon of heat. It is observable, that experience so uniformly teaches us to unite the ideas of light and heat, that none but the philosopher, and he scarcely with intelligibility, would talk of *fire* that is not *luminous*, or *light* that is not *warm*: the first step, therefore, toward an analytical examination of this matter, is to separate in our minds, the *warmth* and the *light* of our hearths. To assist this attempt, we must remember that fire certainly can exist, without the company of light, since both coals and iron may frequently be met with in a state of perfect blackness, combined with violent heat.

To instance the existence of light without warmth, as in the temperature and brightness of a frosty day, is equally easy; yet, after all, light and heat still recur to the mind as inseparable things; and even of those habituated to abstract considerations, numbers are disposed to affirm that they are one and the same.

That they are not one and the same, has certainly never been proved; but this, of the two, appears the more probable conclusion. *Heat*, as is shewn in the article *Fire*, is one of the attributes of *caloric*; but caloric is not conceived to possess the attribute of *light*, also; and though heat and light are usually found together, this connection has been attributed rather to mutual antipathy than to homogenuousness.

The question is, Why do combustible bodies, in the act of consuming, give out light? It is answered, Because there is a repulsion between light and caloric.

Taking for granted the previous proposition, that all combustible bodies, in greater and less degrees, contain both caloric and light, it is agreed that, supposing the reality of the repulsion, these two substances cannot be accumulated in the same body beyond a certain degree. Arrived at that, if the caloric predominate, it will tend to drive off the light; if the light, on the contrary, happen to prevail, it will displace the caloric. It is on this principle that light flies off, in the form of flame, during combustion.

The present state of this inquiry will not allow another conclusion than an abrupt one, to this article. The properties of light, and the extent of the subject, have been indicated; but to fix the ideas of the reader, with respect to the explanation, would, probably, be only to fix them in error.

LIGHTS, *northern*. See AURORA.

LIGHT HORSE, in military economy, English troops, mounted on swifter horses, and more lightly accoutred, than the life-guards, or heavy horse.

LIGHTER, in naval architecture, a large kind of boat, used in the river Thames for carrying heavy goods, as coals and timber.

LIGHTNING, in meteorology, a flash of light suddenly appearing in the atmosphere, and commonly disappearing in the same instant; sometimes attended with clouds and thunder, and sometimes not.

Lightning is proved, by the experiments of Franklin, to be produced by the electric fluid. Thunder is the explosion of clouds charged with that fluid. Lightning is to thunder, what the *flash* is to the *report* of gunpowder.

A very remarkable property of lightning, the zigzag kind especially, when near, is its seeming omnipresence. If, when a clap of thunder, accompanied with this species of lightning, occurs, two persons are looking different ways, both will perceive the flash; not only that indistinct illumination of the atmosphere which is occasioned by fire of any kind, but the form of the lightning itself; and every angle it makes in its course, will be as distinctly seen by each, as if they had looked directly at the cloud whence it proceeded: and if a person were at that moment looking at a book, or any other object, that he held in his hand, he, also, would distinctly see the form of the lightning, between his eyes and the objects. This property seems peculiar to lightning.

The different forms of the flashes of lightning are all equally found in electric sparks; so that an account of the origin of this difference of form may, by analogy, be drawn. Where the quantity of electricity is small, and, consequently, incapable of striking at any considerable distance, the spark appears straight, without any curvature, or angular appearance; but where the electricity is very strong, and, of consequence, capable of striking an object at a pretty considerable distance, it assumes a crooked or zig-zag form.

LIGNUM *vitæ.* The lignum vitæ tree is a native of the West Indies, and the warmer parts of America: there is also a species, a native of the Cape of Good Hope. It is a large tree, rising at its full growth to the height of forty feet, and measuring from fifteen to eighteen inches in diameter; having a hard, brittle, brownish bark, not very thick. The wood is firm, solid, ponderous, very resinous, of a blackish yellow colour, in the middle, and a hot aromatic taste. It is so hard as to break the tools which are employed in felling it; and is, therefore, seldom used as firewood, but is of great use to the sugar-planters for making wheels and cogs to the sugar-mills. It is also frequently wrought in bowls, mortars, and other utensils. It is imported into England, in large pieces of four or five hundred weight each, and from its hardness and beauty, is in great demand for various articles in the turnery ware, and for trucks of ship blocks. The wood, gum, bark, fruit, and even the flowers of this plant; have been found to possess medicinal virtues.

LIMAX, the *slug*, of which there are sixteen species, the one which we shall notice is the Limax agrestis; body whitish, with black feelers: five varieties, of which some have the power of secreting a large quantity of mucus from the under surface, and forming it into a thread like a spider's web; by this means it often suspends itself, and descends from the branches of trees, or any height it had crawled up to. It is found in gardens, pastures, and groves, from May till December. One of the varieties of this species is that which has been recommended to be swallowed by consumptive persons; it is half an inch long, and when touched it sticks, as if dead, to the fingers.

LIME, in chemistry, an earth of a white colour, moderately hard, but easily reduced to powder.

Lime and limestone differ very materially from each other. *Limestone* is tasteless, scarcely soluble in water, and without power to act on animal substances; *lime* is the reverse of all this. Dr. Black has proved, that this difference is owing to the presence of a fixed air in limestone, and to the want of it in lime. This fixed air has received the denomination of *carbonic acid gas*. Lime, upon this foundation, is esteemed to be a simple substance; and limestone, a composition of carbonic acid and lime, with which is joined a quantity of water. Heat separates the carbonic acid from the lime.

LINEN, in commerce, a kind of cloth, made of flax. In the linen manufacture, one set of people are employed in ploughing and preparing the soil; sowing and covering the seed; weeding, pulling, rippling, taking care of new seed, and watering and grassing the flax, till it is lodged at home: others in the drying, breaking, scutching, and heckling the flax, to fit it for the spinners; others in spinning and reeling it, to fit it for the weaver; others in taking due care of the weaving, bleaching, beetling and finishing the cloth for the market.

LINNEAN SYSTEM of vegetables. See *Botany*.

LINUM, LINT, *or* FLAX, in natural history, a plant, from the fibres of which thread, and cloth, are manufactured.

The L. *usitatissimum*, or common annual flax, is the species of linum cultivated for manufactures and medicine. Its stems are about two feet and a half high, garnished with narrow spear-shaped, alternate grey-coloured leaves, and divided, at their top, into peduncles, or foot-stalks, terminated by small, blue, bell-shaped flowers, appearing in June and July, and succeeded by large round capsules, each containing one seed.

LIQUORICE, in the materia medica, the root of a plant, called by botanists "glycyrrhizza."

LIQUID: fluids have been divided into two classes, viz. those which are elastic, and the non-elastic, or those which do not sensibly diminish in bulk when subjected to pressure. The first class are airs or gases: the second liquids: hence we may define a liquid to be a fluid not sensibly elastic, the parts of which yield to the smallest pressure, and move on each other.

LIQUOR of *flints*. Alkalies have a powerful action on silica: they combine in different proportions: two or three parts of potash, with one of silica, give a compound, which is deliquiscent in the air, and soluble in water: this was formerly distinguished by the name of liquor of flints, but it is now denominated silicated alkali.

LITURGY, a name given to these set forms of prayer which have been generally used in the christian church. The liturgy of the church of England was composed in the year 1547, since which time it has undergone several alterations, the last of which was in the year 1661.

LIVER, in anatomy, a very large viscus, of a red colour, serving for the secretion of the bile or gall. Its figure is irregular; the upper surface being convex, smooth and equal; the lower, hollow and unequal. There is also a remarkable eminence called the porta, where the vena porta enters it.

LOADSTONE, the same with magnet, see MAGNETISM.

LOAN, in finance, money borrowed by government for defraying the extraordinary expences of the state. See STOCKS.

LOGARITHMS are artificial numbers, invented for the purpose of facilitating certain tedious arithmetical operations.

If any series of numbers in arithmetical progression beginning with 0, be taken, and a corresponding series of geometrical numbers beginning with 1, the former series will be logarithms to the corresponding numbers in the latter; thus,

0, 1, 2, 3, 4, 5, 6, 7, 8, 9 logarithms.
1, 2, 4, 8, 16, 32, 64, 128, 256, 512 numbers.

Here 0, 1, 2, &c. are the logarithms of 1, 2, 4, &c. and it will be seen at once, 1. That "Addition in logarithms answers to Multiplication in common numbers."

Thus, if the logarithms 2 and 6, are added together, the sum is 8, which answers to the logarithm of 256, the number that is obtained by the multiplication of 4 and 64, which are the numbers standing under the logarithms 2 and 6. By adding the logarithms 4 and 5 we have 9, which stands over 512, the number obtained by multiplying together 16 and 32. Hence the addition of logarithms answers to multiplication in common numbers.

2. "Subtraction in logarithms answers to division of common numbers."

Divide 256 by 8, and you have 32, over which stands 5 = 8 — 3: the logarithms standing above.

3. "Multiplication in logarithms answers to involution of common numbers."

Ex. The square of 8 is 64; now 3 is the logarithm answering to 8, and 3 × 2, (because 2 is the index of the square), is equal to 6, which is the logarithm of 64.

4. "Division in logarithms answers to evolution in common arithmetic."

Ex. 1. The square root of 256 is 16, over which stands the logarithm 4; which answers to 8 ÷ 2, 8 being the logarithm of 256.

Ex. 2. The cube root of 512 is 8; and 9, which is the logarithm of 512, divided by 3, the sign of the cube, gives 3, which is the logarithm of 8.

The same indices will serve for any geometric series; but the logarithms generally used are those which increase in a tenfold proportion, as

0, 1. 2. 3. 4. 5. 6. &c.
1. 10. 100. 1000. 10000. 100000. 1000000.

Here it is evident, that the logarithms of numbers between 1 and 10, are greater than 0, and less than one, thus the logarithms of 2, 6, 8, &c. are .3010300, .7781513, .9030900, &c.

The logarithms of the numbers between 10 and 100, are greater than 1, and less than 2; thus the logarithm of 15 is 1.1760913, and the logarithm of 95 is 1.9777236.

The logarithms of numbers between 100 and 1000, are greater than 2, and less than 3; thus the logarithm of 165 is 2.2174839, and of 984 is 2.9929951.

The logarithms between 1000 and 10000, must be somewhere between 3 and 4, and so on.

The logarithms in the above series are called indices, which are frequently neglected, the decimal part only being put down; thus, if it be required to find the logarithm of 248, it will be sufficient to put down .3944517, and the number being between 100 and 1000, I know the index is 2. Therefore the rule for finding the index is this:

"The index is always one less than the number of figures in the whole number: or the figures in the whole number must be always one more than the index."

The logarithm of			248	is	2.3944517
—	—	—	2480	-	3.3944517
—	—	—	24800	-	4.3944517
—	—	—	24.8	-	1.3944517
—	—	—	2.48	-	0.3944517
—	—	—	.248	-	— 1.3944517
—	—	—	.0248	-	— 2.3944517
—	—	—	.00248	-	— 3.3944517

Here the decimal figures remain the same: and the only difference is in the indices, which are increased or diminished by unit for every ten-fold increase or decrease of the whole number. It will be observed, that where there is but one whole number, the index will be 0; but if the figures be decimals, as .248, the index is one minus, or — 1; by the prefixing 0 to the decimal figure, the value is diminished in a ten-fold proportion, then the index is — 2, or minus two.

We cannot pursue the subject farther for want of tables, which would be incompatible with this small work.

Logic, the art of thinking and reasoning justly; or, it may be defined the science or history of the human mind, inasmuch as it traces the progress of our knowledge from our first and most simple ideas through all their different combinations, conceptions, and all those numerous deductions that result from variously comparing them one with another.

Log-wood, in the arts, is derived from a low prickly tree, which is found in great plenty at Campeachy, in the bay of Honduras, and is denominated "hœmatoxylon campechianum." It comes to Europe in large logs, cleared from the bark, and is very hard, compact, heavy, and of a red colour. It is in high request among dyers, especially in dying black. It gives out the colour both to water and alcohol; the liquor at first assumes a fine red colour with a shade of purple. The infusion becomes gradually deeper, and at last almost black. To cloth, previously boiled in alum and tartar, it gives a beautiful violet colour, which, however, will not stand. Alkalies render the colour darker, acids change it to yellow. From a variety of experiments it is found that the colouring matter of log-wood bears, in many respects, a strong analogy to tannin, but in others it differs from it.

Longitude, in geography, the distance of any given point from another, in the direction of east or west; as latitude is that distance, in the direction of north or south. Latitude is reckoned in degrees from the equator; longitude, from a meridian (one of the perpendicular lines, on maps or globes, or a line parallel to these), which is fixed upon at pleasure: thus the meridian that passes over Greenwich is the meridian of Greenwich; and it is from this point that the English reckon the distance of places.

As perpendicular lines, drawn from the opposite poles of a globe, are necessarily wider apart at its greatest circumference, than at any other point between that and those poles, it follows that the width of a degree of longitude, which is determined by those lines, increases, either in a southward or northward direction, in the ratio that it approaches the equator. When, therefore, a degree of longitude is mentioned, it is impossible to know what number of miles it contains, unless the degree of latitude be also ascertained. The following table shows how many miles answer to a degree of longitude, at every degree of latitude.

Lat.	Miles.	Lat.	Miles.	Lat.	Miles.	Lat.	Miles.
1	59.99	10	59.08	19	56.73	28	52.97
2	59.97	11	58.89	20	56.38	29	52.47
3	59.92	12	58.68	21	56.01	30	51.96
4	59.86	13	58.46	22	55.63	31	51.43
5	59.77	14	58.22	23	55.23	32	50.88
6	59.67	15	57.95	24	54.81	33	50.32
7	59.56	16	57.67	25	54.38	34	49.74
8	59.42	17	57.37	26	53.93	35	49.15
9	59.26	18	57.06	27	53.46	36	48.54

Lat.	Miles.	Lat.	Miles.	Lat.	Miles.	Lat.	Miles.
37	47.92	51	37.76	65	25.36	78	12.48
38	47.28	52	36.94	66	24.41	79	11.45
39	46.62	53	36.11	67	23.44	80	10.42
40	45.95	54	35.27	68	22.48	81	9.38
41	45.28	55	34.41	69	21.50	82	8.35
42	44.59	56	33.55	70	20.52	83	7.32
43	43.88	57	32.68	71	19.54	84	6.28
44	43.16	58	31.79	72	18.55	85	5.23
45	42.43	59	30.90	73	17.54	86	4.18
46	41.68	60	30.00	74	16.53	87	3.14
47	40.92	61	29.09	75	15.52	88	2.09
48	40.15	62	28.17	76	14.51	89	1.05
49	39.36	63	27:24	77	13.50	90	0.00
50	38.57	64	26 30				

The use of this table will be readily understood. From it, we learn that 10° of longitude in 80° latitude, amount to a hundred and four miles, and two hundredth-parts; while 10° of longitude, in 4° of latitude contain five hundred and ninety-eight miles, and six hundredth-parts.

Longitude, in navigation, is of so much importance to safety and expedition, that the following rewards have been offered by an act of the British parliament as an encouragement to any person who shall discover a proper method for finding it out: the author or authors of any such method, shall be entitled to the sum of 10,000*l.*, if it determines the longitude to one degree of a great circle; to 15,000*l.*, if it determines the same to two-thirds of that distance; and to 20,000*l.*, if it determines the same to one half of the same distance; and half of the reward shall be due and paid when the commissioners of the navy, or the major part of them, agree that any such method extends to the security of ships within eighty geographical miles of the shores; which are places of the greatest danger; and the other half, when a ship by the appointment of the said commissioners, or the major part of them, shall thereby actually sail over the ocean, from Great Britain to any such port in the West Indies, as those commissioners, or the major part of them, shall choose for the experiment, without losing its longitude beyond the limits before-mentioned. The French, Dutch, Spaniards, and other nations, have likewise offered rewards for the same purpose.

In order to find the longitude with the required precision, it is necessary to construct a perfect time-piece; for, since by the motion of the earth round its axis, every point upon its surface describes the circumference of a circle, or 360°, in twenty-four hours time, it is plain it must describe 15° in one hour, because the twenty-fourth part of three hundred and sixty is fifteen. Hence the difference of longitude may be converted into time, by allowing one hour for every fifteen degrees, and proportionally for minutes: so, also, difference of time may be converted into difference of longitude, by allowing fifteen degrees for every hour, and proportionally for a greater or less time. Consequently, the one known, the other is easily found.

Our countryman, Mr. John Harrison, produced a time-keeper of his own construction which did not err more than a second in a month. This was in the year 1726, and he received much encouragement to go on to render his time-pieces still more perfect, and in 1761 his son embarked in a voyage, for Jamaica, with a watch of his father's construction, and he found that it had erred in four months, less than two minutes in time, or about 28¼ minutes of longitude, which was within the exactitude required by the act: he therefore claimed the reward of 20,000*l.* Another trial, to Barbadoes, was demanded, and on his return he received 10,000*l.*, with the promise of the remainder when he should have constructed other watches equally accurate in keeping time. The commissioners likewise agreed with Mr. Kendal, one of the watchmakers appointed by them to receive Mr. Harrison's discoveries, to make another watch on the same construction with this, to determine whether such watches could be made from the account which Mr. Harrison had given, by other persons, as well as himself. The event proved the affirmative, for the watch produced by Mr. Kendal, in consequence of this agreement, went even better than Mr. Harrison's; it was sent out with captain Cook in his second voyage towards the south pole, and round the globe from the year 1772, to the year 1775: when the only fault found in the watch was that its rate of going was considerably accelerated, though in this trial of 3 years and a half, it never amounted to 14'½ a day. The consequence was, that the House of Commons were pleased to order the other half of the reward to be given to Mr. Harrison. This gentleman had also, at different times, received other sums of money, as encouragements to him to continue his endeavours, from the board of longitude; from the East India company, and from opulent individuals.

Longitude, *of a star*, an arch of the ecliptic, intercepted between the first of Aries, and the point of the ecliptic cut by the star's circle of longitude.

LONICERA, *honeysuckle*, a genus of plants of which there are 19 species. The Lonicera grata, or evergreen honey-suckle, is the most beautiful: it grows without any culture in North America: it has strong branches, covered with a purple bark, which are ornamented with lucid green leaves embracing the stalks, and continuing their verdure all the year. The flowers have a strong aromatic flavour, they first appear in June; and there is a constant succession of flowers till the frost puts an end to them.

LORD, in modern history, a title of courtesy, given to all British and Irish noblemen, from the *baron* upward; to the eldest sons of earls; to all the sons of marquises and dukes; and to various officers; as the mayor of London, the chamberlain of the king's household, and the high chancellor of the kingdom. *Lord* is also a general term, equivalent with *peer*; wherefore the *house of peers* is also called the

LORDS, *House of*. See PARLIAMENT, and PEER.

LORD, in law, one who possesses a *fee* or *manor*. This is the primitive meaning of the word; and it was in right of their feofs, that *lords* came to sit in parliament.

LORD *Chamberlain*, the sixth great officer of the crown, to whom belongs livery and lodging in the king's court, and fees from each archbishop and bishop, when he performs homage to the king, and from each peer, at his creation, or doing homage.

LOTION, is such washing as concerns the beautifying the skin, by cleansing it of those deformities which a distempered blood sometimes throws upon it. There is reason to apprehend that almost all the lotions advertised for sale, as quack medicines, contain much poisonous matter, such as muriated mercury, and therefore ought never to be had recourse to.

Lottery. See Chances.

Loxia, the grosbeak, a genus of birds of the order Passeres. The Loxia curvirostra, or crossbill, is about the size of a lark. Its favourite food consists of the seeds of pine; and pine woods are always its principal haunts. It has the manners of a parrot, and in North America it builds on the highest firs, and attaches its nest to the trunk by means of the exuded resin. Loxia pyrrhula, or the bullfinch, is commonly known in this country, changing its residence according to the season, in summer retreating from the habitations of man, in winter preferring orchards and gardens, in which it does great mischief by destroying the buds of trees. These birds may be instructed to whistle a variety of tunes. The Loxia chloris, or greenfinch, is a species of this genus. See Plate, Nat. Hist. Fig. 32.

Lucanus, a genus of insects of the order coleoptera, of which there are 26 species. The principal is the Lucanus cervus, or stag-chaffer, which is the largest of European coleopterous insects, being two or three inches long. It is chiefly found in the neighbourhood of oak-trees, and its larvæ are found in the hollows of those trees, residing in the fine mould usually seen in such cavities, and feeding on the softer parts of the decayed wood. The larva, when arrived at its full size, which is about its fifth or sixth year, forms a hollow in the earth in which it lies, and afterwards remaining perfectly still for the space of a month divests itself of its skin and commences pupa. It lies in this state three or four months, and then gives birth to the perfect insect. The exotic species of this genus are mostly natives of America, but one species has been discovered in New Holland, which differs from the rest in being entirely of a beautiful golden-green colour, with jaws of a brilliant copper colour. See Plate, Nat. Hist. Fig. 33.

Luke, *the gospel of*, a canonical book of the New Testament. Some say that it was properly St. Paul's gospel, and that when that apostle speaks of his gospel, he means what is called St. Luke's. This gospel, as well as the Acts of the Apostles, written by the same evangelist, are supposed to have been two parts of the same volume, and to have been written in the year 63 or 64. St. Luke is pure, copious and flowing in his language, and has a wonderful and entertaining variety of select circumstances in his narration of our Saviour's divine actions. We learn from this author a variety of facts which have not been related by the other evangelists, and his style is well adapted to the history which it is employed on.

Luminous *appearances*. See Sea.

Lungs, in anatomy, a part of an animal body which is the instrument of respiration. The lungs are the largest viscus of the thorax; they are situated in its two sides, with the heart as it were between them. The lungs of animals are popularly called the "lights."

Lustre, in mineralogy, is a term used in works of modern chemistry. The lustre of minerals is of five kinds. 1. Splendent, that is, when in full day-light, the lustre can be seen at a great distance. 2. Shining, when at a distance the reflected light is weak: 3. Glistening, when the lustre is only observable at no greater distance than an arm's length. 4. Glimmering, when the surface held near the eye in full day-light presents a number of shining points. 5. Dull, when the surface has no lustre.

Lute, a musical instrument, consists of four parts, viz. the table; the body or belly, which has nine strings; the neck, which has nine or ten stops or divisions, marked with strings, and the head or cross, where the screw for raising and lowering the strings to a proper pitch of tone are fixed. In the middle of the table there is a passage for the sound; there is also a bridge that the strings are fastened to, and a piece of ivory between the head and neck, to which the extremities of the strings are fitted. In playing, the strings are struck with the right hand, and with the left the stops are pressed.

Lutra, the otter, a genus of mammalia, of the order Feræ, of which there are eight species. The Lutra vulgaries, or common otter, lives chiefly on fish, and may be trained to catch fish for its owner. One kept by Mr. James Campbell would catch ten salmon in a day. Otters, in their wild state, have a propensity for destruction, killing many more fish than they eat. The Lutra Marina, or sea-otter, is very valuable for its skin, a single fur has been sold among the Russians for twenty-five pounds. Sea-otters are perfectly inoffensive, and the female manifests the most affectionate attachment to her young. These animals feed on crabs, lobsters, and other shell-fish. The flesh of the young is reckoned like that of lamb, and is highly valued. See Plate, Nat. Hist. Fig. 34.

Lutherans, christians who follow the opinions of Martin Luther, a reformer of the sixteenth century. Leo. X. to whose elegant taste Europe is so much indebted, either found, or created, considerable embarrassments in the papal finances. To repair these, and particularly to procure a sum of money adequate to the completion of the church of St. Peter, he caused indulgences to be offered to sale in an abundance till then unknown. They were hawked about christendom; and their plenty occasioned their price to be very low. Whether the Augustines were scandalized at the general indelicacy of the procedure; or whether they were displeased at the low estimation into which a profitable commodity was brought; or, rather, at the partiality with which the Pope had given the sale to the Dominicans, is uncertain; but so it happened, that a contention arose between these two orders of monks. The vicar-general of the German Augustines fixed upon Luther, one of the body, as a person qualified to support their cause in the pulpit: this man had a vehement eloquence, well calculated to promulgate his opinions; and his colleagues discovered, too late, that those opinions went greatly beyond the bounds they desired. The war which had been raised, continued: but the parties to the quarrel were soon changed: the Augustines and Dominicans rallied round the same standard, and considered the Lutherans as their common enemy.

In 1520, Luther sent his book, *De libertate Christiana*, to the Pope: in this work, he grounds justification upon faith only, asserts christian liberty

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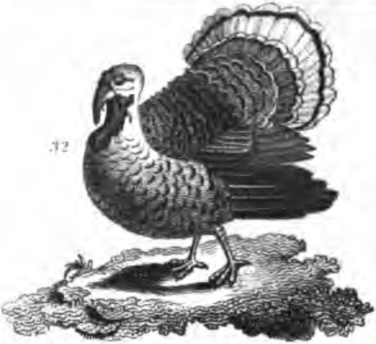

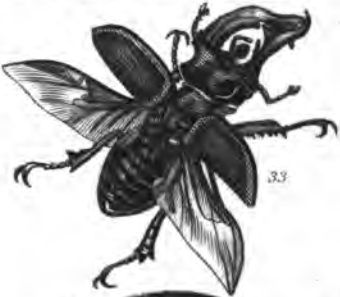

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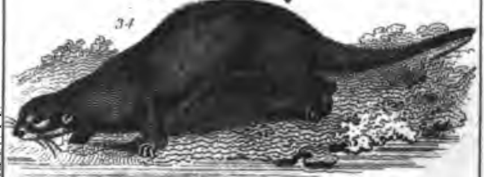

Cooper sculp.

Fig. 32. **Meleagris** *Gallipavo: Turkey.*
Fig. 33. **Lucanus** *cervus: stag-chaffer.*
Fig. 34. **Lutra** *Otter.*

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against the bondage of human traditions, and more particularly of papal impositions; and in a subsequent remonstrance, he denies the authority of the Roman church. These proceedings were instantly followed by Leo's bull of excommunication: an instrument which Luther threw into a fire that he had caused to be made without the walls of Wirtemberg.

That the age was ripe for this hierarchal revolution, is evident; since Luther had the extraordinary fortune to see, in the short space of his own life, his tenets receive national establishment, not only throughout Upper Saxony, where the elector had from the first protected him, but in the northern provinces of the empire; and even set up in Sweden and Denmark, by a formal league between the two crowns.

LYON, or LION, *king at arms*, see KING *at arms*.

LYRE, a musical instrument of the stringed kind. The modern lyre, or Welsh harp, consisting of forty strings, is well known, but the structure of ancient lyres cannot be ascertained: The lyre among poets, painters and statuaries is attributed to Apollo and the muses.

M.

M, the twelfth letter, and ninth consonant of the English alphabet, is a liquid and labial consonant, pronounced by striking the under lip against the upper one. M. as a numeral stands for mille, a thousand; and with a dash over it thus $\bar{M}$, 1,000,000. M. A. magister artium: M. D. medicinæ doctor:

MS. manuscript and MSS. manuscripts. In the prescriptions of physicians M. stands for manipulus, a handful.

Maccabees, two apocryphal books of Scripture, containing the history of Judas and his brothers, and their wars against the Syrian kings in defence of their religion and liberties. The first book is an excellent history, and comes nearest to the style of the sacred historians. The second book of the Maccabees begins with two epistles sent from the Jews of Jerusalem, to the Jews of Egypt and Alexandria to exhort them to observe the feast of the dedication of the new altar erected by Judas on his purifying the temple.

Machine, in general, whatever hath force sufficient to raise or stop the motion of a heavy body. Machines are either simple or compound; the simple are the six mechanical powers, viz. the lever, pulley, wheel and axis, inclined plane, wedge, and screw. See Mechanics.

Macropus, the kangaroo, is a genus of mammalia of the order feræ. This is one of the most curious animals discovered on the continent of New South Wales, where it was first observed in 1770 by Captain Cook's sailors. Its general position, when resting, is that of standing on its hind feet, on their whole extent, to the knees, and its fore feet are frequently employed like those of the squirrel, as hands. In its rapid motion, the fore feet are wholly useless, and it proceeds by leaping on its hind feet, which it will do to the distance of 15 or 16 feet, and with bounds so rapid in succession, that it exceeds in swiftness the common dog. See Plate Nat. Hist. fig. 35.

Maculæ, dark spots appearing on the luminous faces of the sun, moon, and even some of the planets. They were first discovered by Galileo, soon after he had invented his telescope. It has been supposed that these spots adhere to, or float upon the surface of the sun, because, 1. Many of them are observed to break near the middle of the sun's disc, others to decay and vanish there, or at some distance from his limb. 2. Their apparent velocities are always greatest over the middle of the disc, and gradually slower from thence on each side towards the limb. 3. The shape of the spots varies according to their position on the several parts of the disc; those which are round and broad in the middle grow oblong and slender as they approach the limb, as they ought by the rules of optics. By means of these spots the diurnal revolutions of the sun and planets have been discovered. See **Solar** *system*, and **Sun**.

Madrigal, in the Italian, Spanish, and French poetry, a short and amatory poem, composed of a number of free and unequal verses, neither confined to the regularity of a sonnet, nor to the point of an epigram, but only consisting of some tender and delicate thought, expressed with a beautiful, noble, and elegant simplicity.

Magic *lanthorn*. See **Optics**.

Magna *charta*, see **Charta**.

Magnet, *or* **loadstone**, in natural history, a very rich iron ore, found in large detached masses, of a dusky iron-grey, often tinged with brownish or reddish; and, when broken, appearing something like the common emery, but less sparkling. It is very heavy, considerably hard, of an irregular and uneven surface. Its structure is firm, but, usually, with some porous irregularities within. It is found in England, and all other places where there are iron mines.

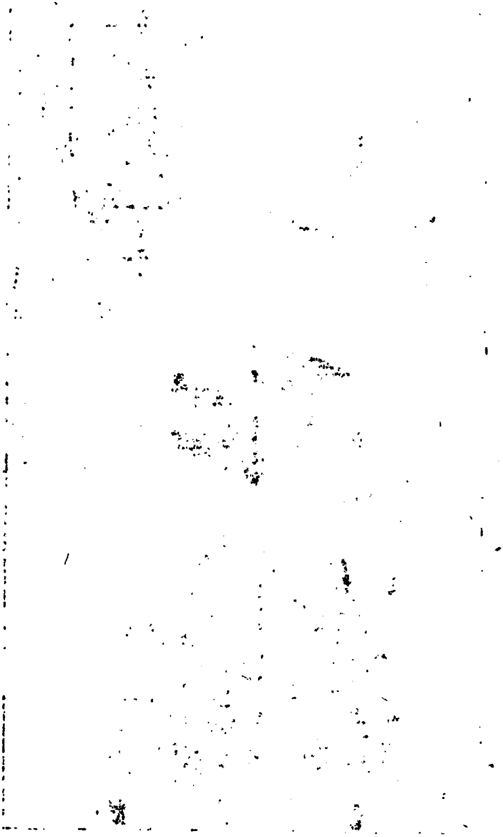
Magnet, *artificial*, a steel-bar impregnated with the virtues of the magnet, so as to possess all its properties, and be used instead of the natural loadstone.

Magnetism, explains the properties of the natural magnet, and shews by what means artificial ones are made. All magnets attract iron, and other substances that contain iron: this is called their *attractive* power. When a magnet is at liberty to move freely it constantly turns the same part towards the north pole of the earth, and the opposite part towards the south pole. This has been termed its directive power. The ends of the magnet are called the poles, which are denominated north and south according as they point to the north or south pole, and when a magnet places itself in this direction, it is said to traverse. When a magnet is left at liberty, its two poles do not lie in a horizontal direction, but one inclines downward, and the other is elevated upwards. This is called the *inclination* or the dipping of the needle. If a magnet be placed on cork, and allowed to float freely on water, with no iron near it, it places itself in the magnetic meridian. This is the property which renders it of so much use to seamen. The natural direction of the magnet is towards the northern and southern parts, yet it rarely points due north and south, and the difference is called the declination, which is said to be east or west according as the north pole of the needle is eastward or westward. The attraction of the magnet and iron is mutual, that is, the iron attracts the magnet as much as the magnet attracts the iron. The attraction of every magnet is strongest at the poles, and in the centre point between the poles there is no sign of attraction whatever: here the attraction of the two poles seems to balance one another. This attraction is not diminished by the interposition of other bodies, except iron. Put a needle on a pewter plate, and it will follow the magnet which is moved on the outside. When a piece of iron is brought within a certain distance of a magnet, it becomes itself a magnet, that part of it which is nearest the south-pole of the magnet is a north pole of the iron, and vice-versa. An artificial magnet, or a magnetic needle, is made by fastening the steel on a piece of board, and drawing magnets over it several times, from the centre to the ends. The power of a magnet is not diminished by communicating its properties to other bodies. Two or more magnets joined together may communicate a greater power to iron or steel than either of them possesses singly.

The Mariner's Compass consists of a box such as is represented in fig. 22. Plate Miscellanies. The box, which contains the card or fly, is circular, and made of wood, or brass, or copper, and is suspended within another box by means of concentric circles, called gimbals, so fixed by cross axes to the two boxes, that the inner one or compass box shall retain an horizontal position in all the motions of the ship, while the outer box is fixed with respect to the ship. The card is a circular piece of stiff paper, the outer edge of which is divided into 360 parts, or degrees, and within the circle of these divisions, it is again divided into 32 parts called rhumbs, or points of the compass.

The Azimuth Compass differs from the common sea compass in this, that the circumference of the card or box is divided into degrees; and there is fitted to the box an index with two sights, which are upright pieces of brass, placed opposite each other, having a slit down the middle of them, through which the star or sun is viewed at the time of observation.

Magnesia, in chemistry, an earthy substance which exists in abundance, in combination with other substances, but has never been found perfectly pure in nature. It is an ingredient in many fossils; and several of the salts, which it forms in combination with the acids, are found in mineral springs, and in the water of the ocean. From these combinations, magnesia is obtained by different artificial processes. Take one part of Epsom salt and let it be dissolved in twenty parts of water: the solution is to be filtered, and to this is to be added, while hot, a solution of pure potash or soda, as long as precipitation is produced. The alkali combines with the sulphuric acid, and the magnesia is separated, and falls down in white powder. It is then washed in water till the liquor comes off tasteless. This earth exists under the form of a white powder: it is much used in medicine as a very gentle laxative, and as an absorbent to destroy acidity in the stomach. Epsom salt is compounded of sulphuric acid and magnesia, the chemical name is of course the sulphate of magnesia. The carbonate of magnesia, or magnesia compounded with carbonic-acid-gas, is among physicians a very important compound.



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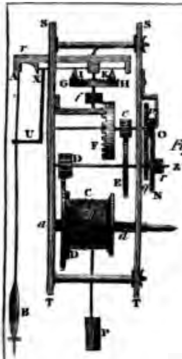


Fig. 20.

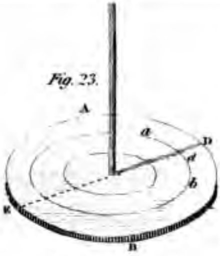


Fig. 23.

Fig. 22.

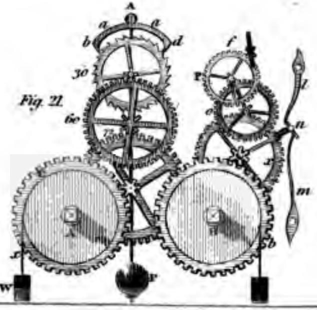


Fig. 21.

Cooper Sculp.

Published by J. Harris St. Pauls Ch. Yd. [illegible].

Maiden, in modern history, an instrument used formerly in Scotland for beheading criminals.

This is a broad piece of iron, about a foot square, very sharp on the lower part, and loaded above with a heavy weight of lead. At the time of execution it is pulled up to the top of a narrow wooden frame, about ten feet high, and as broad as the engine, with mouldings on each side for the maiden to slide in. A convenience is made about two feet from the ground, for the prisoner to lay his neck; and there is a kind of bar so fastened as to keep him from stirring. The prisoner being thus secured, and the sign given, the maiden is let loose, which in a moment separates his head from his body. See Guillotine.

Malic *acid*, is discovered in the juices of many kinds of fruit, particularly in apples, hence the term Malic, from malum an apple. The common houseleek affords abundance of this acid. It combines with earths, alkalies, &c. and the compounds are called Malates.

Malleable, a property in metals whereby they are capable of being extended under the hammer.

Malt, in commerce, a preparation of barley, and from which is made a potable liquor, called beer, or ale.

The processes of *malting* have for their objects, first, to excite the vegetative powers of the grain, and, then, to stop vegetation. Thus, by the aid of moisture, the barley is made to germinate, that is, to put forth roots, and almost its acrospire, or first sprout; and by the aid of fire, the roots are destroyed, and the acrospire prevented from bursting the skin. By germination, all the principles of the grain are put in motion. The heat which it subsequently undergoes, separates its parts, and the viscidity which it before possessed, is removed by the looser texture of its oils, and their intimate union with the salts; which alteration is the cause of the sweetish taste that distinguishes malt from barley.

Mamalukes, the name of a dynasty that reigned in Egypt. They were originally Turkish and Circassian slaves.

Mammalia, in the Linnæan system of zoölogy, the first class of animals, comprehending such as *suckle* their young. This class is divided into seven orders:

I. *Primates*, animals that have two canine teeth, and four cutting teeth. Of this order there are only three genera; man, the monkey, and the bat.

II. *Bruta*, animals that have no cutting teeth; as the elephant.

III. *Feræ*, animals that have from two to ten cutting teeth; as, the lion.

IV. *Glires*, animals that have only two cutting teeth, and no canine teeth; as, the hare.

V. *Pecudes*, animals that have no cutting teeth in the upper jaw; as, the sheep.

VI. *Belluæ*, animals with cutting teeth in each jaw, and which are furnished with hoofs; as, the horse.

VII. *Cete*, or *whales*.

Man, in natural history, a general name for the human race. As an animal, man is strikingly distinguishable from the rest of the creatures of the earth, on account of the ingenuity with which he employs the productions of nature for his accommodation. All animals are disposed to make use of these productions; but man in a measure, *creates* them. The brute seeks shelter from the tempest; but man forms it for himself. Man is also distinguishable by the originality of his ideas. *Instincts* make up a part of his character; but he is principally the creature of experience and reflection; he builds a habitation, because he has *experienced* the inclemency of the weather, and because he has *reflected* upon the means of securing himself against its rage. When he builds, too, it is not like the work of the bee or the beaver, upon any instinctive plan, and that plan the best possible for the purpose, but one in which he presently discovers imperfections; and from which, that of another individual of the same species is totally different. Men are strongly disposed to *imitation*; but if they think for themselves, they act in very dissimilar manners.

Man is also farther distinguishable from other animals, in that his existence appears to be unnecessary to the economy of nature. With respect, therefore, to the things of this world, it is probably not at the mere suggestion of vanity, that he considers himself as the end for which *they* were created. For what purpose he himself exists, it would be strange, indeed, if it were possible for him to discover. This, however, is a question in metaphysics, whither all inquiries regarding man necessarily tend. The structure of the human body is considered under the head of ANATOMY.

MANAGE, or MANEGE, an academy, or place for learning to ride the great horse, as also for breaking horses to the proper motions and actions. In every manage is a centre, or place destined for vaulting round a pillar; a course, or careers, for running the ring; and on each side, pillars, between which are placed the horses destined for high airs.

Manganese, in mineralogy, a metal which is found in great abundance in Sweden, Germany, France, Italy, and England. Its ore is of service in the glass manufactory, where it is used to remove the greenish hue from white glass. The manganese of Germany is the best.

Manna, a honey-like juice, brought from Calabria and Sicily, sometimes in small granules, or drops of an irregular figure, roundish, oblong, crooked, and sometimes contorted. It should be chosen whitish, or, at the utmost, with only a faint cast of yellow, not too heavy, in regular dry granules, or moderately long flakes, of a pleasant taste, and dissolving wholly in the mouth. It is obtained from several sorts of trees, especially the ash: and the finest kind is that which oozes naturally out of the leaves: the coarser is obtained by wounding the bark of the trunk and branches of the tree.

Manslaughter, a species of homicide, being the act of killing a person without premeditated malice. See Homicide.

Mantis, a genus of insects of the order hemiptera; there are upwards of sixty species: the chief is Mantis oratoria, or camel-cricket, which is found in the southern parts of Europe, and is entirely of a beautiful green colour. It is nearly three inches in length, of a slender shape, and in its general sitting-posture, is observed to hold up the two fore legs, as if in the act of devotion: hence it has been regarded as sacred, and a notion has prevailed, that a traveller having lost his way would be safely directed by observing the quarter to which the animal pointed when taken in the hand. This insect is of a predacious disposition, living on smaller insects, which it watches for with great anxiety; it is also quarrelsome, and when kept with others of its own species in a state of captivity, they will attack each other with the utmost violence, till one is destroyed. The conqueror devours his antagonist. Mantis precaria is said to be the idol of the Hottentots.

Map, a plane figure representing the surface of the earth, or some part of it; being a projection of the globular surface of the earth, exhibiting countries, seas, rivers, mountains, &c. in their due position or nearly so. In maps three things are required. 1. To shew the latitude and longitude of places, which is done by drawing a certain number of meridians and parallels of latitude. 2. The shape of the countries must be exhibited as accurately as possible. 3. The bearings of places and their distances from each other must be shewn. The use of maps is obvious from their construction. The degrees of the meridians and parallels shew the latitudes and longitudes of places, and the scales of miles annexed, their distances; the situation of places, with regard to each other, as well as to the cardinal points, appears by inspection; the top of the map being always north, the bottom south, the right hand the east, and the left hand the west; unless the compass, usually annexed, shews the contrary.

Marble, in natural history, a genus of fossils, comprising bright and beautiful stones, composed of small separate concretions, moderately hard, not giving fire with steel, fermenting with and soluble in acid menstrua, and calcining in a slight fire.

Marbles, Arundel, ancient marbles with a chronicle of the city of Athens inscribed on them, many years before the birth of Christ, presented to the University of Oxford, by Thomas earl of Arundel. See Arundelian.

March, the third month of the year, according to the common way of computing. Among the Romans, March was the first month, and in some ecclesiastical computations, that order is still preserved, as particularly reckoning from the incarnation of our Saviour, that is from the 25th of March. The ancients reckoned March and May as unpropitious to the rites of marriage.

Marines, or *marine soldiers*, men equipped in the manner of infantry, but who serve on board of ship, where they fight whenever the enemy is sufficiently near to allow of small-arms taking effect, and where they are a check upon the seamen, in case of mutinous disposition.

Mark, gospel of, a canonical book of the New Testament. St. Mark wrote his gospel at Rome, where he accompanied St. Peter in the year 64 or 65. Some have thought that Mark was only an amanuensis to St. Peter, though others imagine that this gospel was not written till after the death of Peter. It appears, from the accounts given of it by the ancients, to contain the substance of Peter's preaching. Many circumstances and facts occur in this gospel that are not to be found in any of the other three, which prove that the writer was an original author, and not a mere epitomiser.

Mark, a money of account, or a coin. The English mark is two thirds of a pound sterling, or 13*s.* 4*d.*

Marque, *letter of*, a power granted by a state to its subjects, to make reprisals on the subjects of a state with whom it is at war.

Marquis, in modern history, a title of honour, next in dignity to that of duke, first given to those who commanded the marches, that is, the borders and frontiers of countries. Marquisses were not known in England till Richard II. in the year 1387, created Robert de Vere, Marquis of Dublin.

Marriage is the lawful conjunction of man and wife. Marriage is a civil contract, and it is good and valid, where the parties, at the time of making it, are willing to contract: are able to contract, and do actually contract. Marriages one with another produce four children, rather more than four in the country, and less than that number in large towns. The durations of marriages have been estimated with great care, the result of which is given in the following table. Those whose ages together make

40	live together between	24 and 25 years.
50	- - - - - - -	22 — 23
60	- - - - - - -	20 — 21
70	- - - - - - -	19 — 20
80	- - - - - - -	17 — 18
90	- - - - - - -	14 — 15
100	- - - - - - -	12 — 13

The duration of survivorship, or of widowhood, in the husband or wife, is equal to the duration of marriage, when the ages are equal; of course the number of survivors, or of widows and widowers, (supposing no second marriages), alive together will be equal to the whole number of marriages.

Marrow, in anatomy, a soft oleaginous substance, contained in the cavities of the bones. Marrow is found to consist of a number of fine, subtile, fat, oleaginous substances, and of minute vesicles of a membranaceous structure, in which the former is secreted from the arterial blood, in the same manner as the fat of the rest of the body. This substance penetrates the fibres of the bones, and preserves them from dryness, and from consequent brittleness.

Mars, in astronomy, the planet that revolves next beyond the earth in our system, is of a fiery or reddish colour. He is not subject to the same limitation in his motions as Mercury and Venus, but appears sometimes near the sun, and at others at a great distance from him, sometimes rising when the sun sets, or setting when he rises. Mars appears to move from west to east round the earth, his periodical motion round the sun is in 687 days nearly. His apparent motion is very unequal, and he moves about his axis in little more than one of our days and nights. See Solar System.

Marshal, in its primary signification, means an officer who has the command or care of horses; but it is now applied to officers who have very different employments, as earl-marshal, knight-marshal, or marshal of the king's house. See Earl-marshal, and Knight-marshal.

Mast, in naval architecture, a large timber in a ship, on which are suspended the sails. In large vessels there are four masts; viz. the main-mast, fore-mast, mizen-mast, and bowsprit. The main-mast is the principal one, standing in the middle of the ship; the mizen stands behind, and the fore, before the main. The mizen is considerably shorter than either of the others.

Master *in chancery.* The masters in chancery are assistants to the Lord Chancellor and Master of the Rolls, of these there are 12 in ordinary; besides extraordinary Masters; of the former some sit in court every day during term, who have business, as it arises, referred to them. The Masters Extraordinary are appointed to act in the country, in the several counties in England, beyond ten miles distance from London, by taking affidavits, recognizances, acknowledgments of deeds, &c. for the case of suitors of the court.

Master *of the Rolls:* a patent officer, who has in his custody the rolls of parliament, and patents which pass the great seal, records in chancery, commissions, deeds, &c. which being made of rolls of parchment gave rise to the name. In the absence of the chancellor he sits as judge in the court of chancery.

Mastic, a solid resin, of a pale, yellow, white colour, principally brought from the island of Chios in drops or tears, as it naturally forms itself in exuding from the tree, about the bigness, and much in the form, of a pea. It is to be chosen clear, pellucid, and of a pale yellowish colour, well scented, and brittle.

Mathematics, originally, any discipline or learning; at present, that science which teaches, or contemplates, whatever is capable of being numbered or measured, in so far as computable or measurable; and, accordingly, subdivided into arithmetic, which has numbers for its object, and geometry, which treats of magnitude.

Mathematics are commonly distinguished into pure or speculative, which consider quantity abstractedly; and mixed, which treat of magnitude as subsisting in material bodies, and consequently are interwoven every where with physical considerations.

Mathematical *Instruments*. See **Instruments**.

Matter, in physics, whatever is extended and capable making resistance: hence, because all bodies, whether solid or fluid, are extended, and do resist, it is concluded, that they are material, or made up of matter.

Maunday *Thursday*, is the Thursday in Passion week, which was called Maunday or Mandate Thursday, from the command which Christ gave his disciples to commemorate him in the Lord's supper, which he this day instituted; or from the new commandment which he gave them to love one another, after he had washed their feet as a token of his love to them. The humility of Jesus in washing his disciples' feet was formerly commemorated on this day, by most christian sovereigns, who washed the feet of a certain number of poor persons, not with their own hands, but by those of the lord almoner or other deputy: now the ceremony is done away, and instead of this act of humility they dispense certain charitable donations among the poor: thus we are told that on Maunday Thursday, 1811, seventy-three persons (the number is regulated by the age of the king) received from the lord almoner at St. James's, each a silver penny and some bread, meat, fish, &c.

Maxim, an established proposition or principle; in which sense it denotes the same as axiom. Maxims are self evident propositions, and the principles of all science, for on these and definitions all demonstrative knowledge depends. See Axiom.

May, the fifth month in the year, reckoning from January; and the third, counting the year to begin with March. This month derives its name from Maia, the mother of Mercury, to whom they offered sacrifice on the first day of it: Hence May-day garland. The month of May has been esteemed favourable to love, but inuaspicious to marriage. See March.

Measure, See Mensuration.

Mechanics, that branch of practical mathematics which considers motion and moving powers, their nature and laws, and their effects in machines. The term mechanics is equally applied to the doctrine of the equilibrium of powers, more properly called statics, and to that science which treats of the generation and communication of motion, which constitutes mechanics, strictly so called. The knowledge of mechanics is one of these things that serves to distinguish civilized nations from savage. It is by this science, that the utmost improvement is made of every power and force in nature; and the motions of the elements, water, air, and fire, rendered subservient to the various purposes of life: for, however weak the force of man appears to be, when unassisted by this art, yet, with its aid, there is hardly any thing above his reach. It is distinguished, by Sir Isaac Newton, into practical and rational mechanics; the former of which treats of the mechanical powers; the latter of the whole theory of motion; it shows, when the powers of forces are given, how to determine the motions that are produced by them; and conversely, when the phenomena of the motions are given how to trace the powers or forces from which they arise.

The mechanical powers are simple engines that enable men to raise heavy weights, and overcome resistances which they could not do with their natural strength. There are six of these, which have been already referred to, viz. the lever, the wheel and axis, the pulley, the inclined plane, the wedge, and the screw. These we shall briefly describe, giving, at the same time, some account of their properties and application. The *lever* may be considered as an inflexible bar of wood or iron, used chiefly to raise large weights to small heights, it is supported by a prop or fulcrum, on which all the parts turn as the centre of motion. There are three kinds of levers, distinguished by the places in which the weight and power are applied. See Plate MECHANICS, fig. 1.

A lever of the first kind is when the weight W is applied at one end, and the power P at the other: the fulcrum B is some where between the weight and the power. A lever of the second kind is when the fulcrum A, fig. 2, is at one end, the power at the other, and the weight between them. The third kind of lever is when the weight is at one end, and the power between the fulcrum and weight. If the weight and power change places, then fig. 2 represents a lever of the third kind. A poker in the act of stirring the fire is a lever of the first kind; the bar of the grate being the fulcrum, the coals the weight to be moved, and the hand the power. Steel yards, fig. 3, scissars, pincers, snuffers, &c. all act upon the principle of levers of the first kind. Every door turning on its hinges is a lever of the second kind, the hinges are the fulcrum or centre of motion, the door is the weight to be moved, and the hand, in opening it, is the power. An oar applied to the moving a boat is a lever of this kind, so is the rudder of a vessel, likewise large cutting-knives, used by patten-makers, turners, chaff-cutters, &c.

A ladder to be raised against a wall is a good representation of a lever of the third kind: the wall or other obstacles against which the lower end is pushed may be regarded as the fulcrum: the top of the ladder is the weight, and the power is the strength applied.

In all the mechanical powers it is a maxim that the advantage gained is in proportion to the space passed over by the moving power.

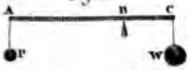
The second mechanical power is the wheel and axis, fig. 4, which consists of a wheel A B, turning on an axis C D, and the advantage gained is in proportion as the circumference of the wheel is greater than that of the axis. The projecting spokes *a* have the effect of increasing the diameter and circumference of the wheel, and accordingly of increasing the power. Cranes of all kinds, windlasses, capstans, and axles turned by means of winches are to be referred to the wheel and axis.

The third mechanical power is the pulley, which is a small wheel turning on an axis with a rope passing over it. It is used to change the direction of a weight. Such is fig. 5. which gives no mechanical advantage, and is called a single fixed pulley. A B, fig. 6, is a moveable pulley to which the weight W is attached, this rises and falls with the weight, and the advantage gained by the pulley is as two to one. That is, the power P of 5lb. will balance a weight W of 10lb. for the power moves through twice as much space as the weight, and the advantage gained is always in proportion to the space passed over by the moving power. The advantage gained by pulleys in general, is estimated by multiplying the number of pulleys in the lower block by 2; that is, if instead of one pulley A B, there be two as in fig. 7; or five as in fig. 8, there must be as many in the upper block, and the power gained will be as 4 in the one case, and as 10 in the other. The last figure represents the solid block pulley invented by Mr. James White, a most ingenious mechanic.

The fourth mechanical power is the inclined plane, which is made by planks, &c. laid in a sloping direction, such is fig. 9. on which large and heavy bodies may be more easily lowered or raised, than by a mere lift. Inclined planes are particularly useful in rolling casks of sugar, oil, beer, &c. into warehouses above or below the level of the street. Here it is evident power is gained in proportion as the length A D is greater than the perpendicular B D, thus if A D be 9 feet and D B only 3 feet, then a force exerted equal to 1 Cwt. will sustain a weight W of 3 Cwt.

The wedge, fig. 10, may be regarded as two inclined planes, and of course the gain of power is estimated in proportion as the length of the two sides B F F A is greater than that of the back

Fig. 1.



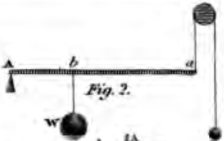


Fig. 2.

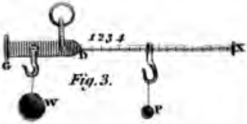
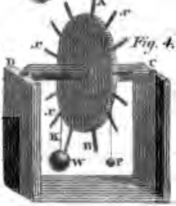


Fig. 3.



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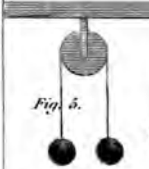


Fig. 5.

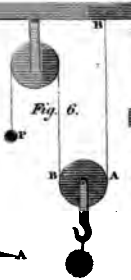


Fig. 6.

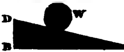


Fig. 9.

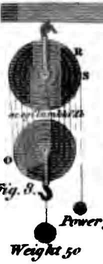


Fig. 8.

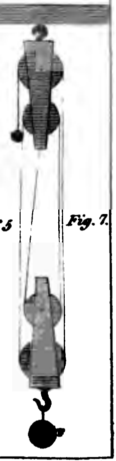


Fig. 7.

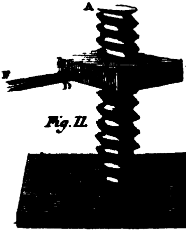


Fig. 11.

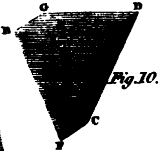


Fig. 10.

Cooper sculp.

Published by J. Harris, St. Pauls Ch. Yd. 1801.

A B. Chisels, hatchets, and other sharp instruments, which are sloped down to an edge on one side only, are to be referred to the inclined plane, and those instruments that are sloped down on both sides, act on the principle of the wedge. The chief use of the wedge consists in its being urged by the stroke of a hammer, wedge, &c. and not by mere pressure. By repeated blows the wedge is used to split wood, rocks, &c.

The last mechanical power is the screw, fig. 11, which is always turned with a handle, &c. acting like a lever, and which gains advantage in proportion as the circumference of the circle made by the lever is greater than the distance between two threads of the screw. The screw is used for pressing light bodies close together, as in presses for paper-makers, book-binders, packers, &c. A common cork screw in passing through the cork acts upon this principle.

We have, under the article Friction, shewn that one fourth, or even one third of the supposed power gained must, in practice, be allowed when we calculate upon what is really gained by the mechanical powers. The capital advantages of these powers are, that by their means we can raise and move from place to place large weights, as blocks of stone, which could not be moved without them: we can give almost any direction to the moving power, and apply its action at a distance from the body to be moved. See Motion, Powers *moving*.

Mean, a middle state between two extremes: thus we have an arithmetical mean; a geometrical mean; mean distance; mean motion, &c.

An arithmetical mean, is half the sum of the extremes, thus, if 2 and 12 be the extremes, the mean is equal to $\frac{2+12}{2}=7$.

Geometrical mean, called a mean proportional, is the square root of the product of the two extremes; thus a mean proportional between 6 and 24 is equal $\sqrt{6\times 24}=\sqrt{144}=12$.

Medal, a piece of metal in the form of coin, intended to convey to posterity the portrait of some great person, or the memory of some illustrious action. See **Mint**.

Medallion, a medal of an extraordinary size, supposed to be antiently struck by the emperors for their friends, and for foreign princes and embassadors.

Mediterranean, the Mediterranean, called by the Greeks, Mare Internum, and by the Jews, Mare Magnum, is a vast gulf of the Atlantic Ocean, with which it has a communication by a narrow strait at the southern extremity of Spain, and is bounded on the South by Africa, and on the North by Spain, France, Italy, European Turkey, and Asia Minor.

Its length from the strait of Gibraltar to the coast of Syria, is computed to be 2,300 miles, and its breadth in some places 900, in others not 800 miles.

As there is a constant influx of water from the Atlantic and Euxine seas, and from many considerable rivers, into the Mediterranean, yet no visible discharge, some philosophers have supposed that it has a subterraneous communication with the ocean; but no sign of any such communication has been discovered. Without having recourse, with Buffon, to the sinking of immense caverns, into which the sea has from time to time retired, other causes of the diminution of the Mediterranean may be assigned. It is highly probable that there is a reflux, or lower current, in the straits of Gibraltar: a considerable quantity of water is incessantly raised into the atmosphere by evaporation: and, though there are no perceptible tides in this sea, except in the gulf of Venice, and on the coast of Tripoli, yet part of it may be converted into earth by the action of the winds as well as by heat.

No direct communication between the Mediterranean and the Red Sea, by a canal, appears to be practicable, because the opposite coasts of both are low and marshy, and the intermediate barren plain of 10 leagues is destitute of water. A communication, however, between these seas, might be opened by the medium of the Nile. A canal was anciently formed in this direction, and repeatedly restored. From Cairo it extended to Kelzoun, in the vicinity of Suez; and some vestiges of it still remain. There are several considerable islands in the Mediterranean, viz. Sicily, Sardinia, Corsica, Cyprus, Majorca, &c.

The strait of Gibraltar is about 14 leagues in length, and 8 in breadth. In navigating this strait three capes occur on either coast. Cape Trafalgar is opposite to Cape Spartel; Tariffa to Alcazar; and Gibraltar to Ceuta. The two last mentioned capes, anciently called Calpe and Abila, were the pillars of Hercules; and the strait was distinguished by the appellation, Fretum Herculeum, and Fretum Gaditanum, or strait of Cadiz, from a small island on the coast of Spain.

Meleagris, the Turkey, a genus of birds of the order Gallinæ, of which there are two species. The Meleagris galipavo, or wild turkey, is a native of America, and in the northern parts of that continent these birds are found in flocks of several hundreds, which, during the day time, resort to the woods, feeding principally on acorns, returning, at night, to some swampy grounds, where they roost upon the highest trees. In Carolina they grow to the weight of 30 or 40 pounds.

Membrane, in anatomy, a pliable texture of fibres, interwoven together in the same plane.

Memory, *artificial*. The principal difficulty in attaining a competent knowledge of history, consists in retaining the dates of the several epochas, æras, &c. to which the principal facts and occurrences in history belong. This difficulty is chiefly obviated by "memorial lines," made up of artificial words, invented, or adopted, by the late Dr. Grey, the use and application of these may be denominated "Artificial Memory," or, according to the inventor, MEMORIA TECHNICA.

"Of all things," says a celebrated philosopher and scholar, "there is the greatest difficulty in retaining *numbers*. They are like grains of sand, which will not cohere in the order in which we place them; but by transmuting the figures into letters, which easily cohere, in every form of combination, we fix and retain numbers in the mind with the same ease and certainty with which we remember words. Thus when Dr. Grey, in his Memoria Technica, annexes a chronological date to the *termination* of the name, it is only pronouncing it with his variation, and we instantly recollect its proper date. For example, if we remember that Dr. Grey calls Rome Rem-put, which the oddness of the variation will make us less liable to forget, since, as we shall hereafter see, he makes *p* stand for 7, *u* for 5, and *t* for 3, we immediately recollect, that 753 is the date usually assigned to the building of Rome. If, moreover, we can learn to repeat the names of the kings of England, in the order in which he has digested them, we shall have not only the years, when each of them began to reign, but also the order of their succession. As this method is so easily learnt, and may be of so much use in recollecting dates, when other methods are not at hand, particularly in conversation and reading history, when dates are often wanted, I think all persons of a liberal education inexcusable who will not take the small degree of pains that is necessary to make themselves masters of it, or who think any thing mean or unworthy of their notice, which is so useful and convenient."

To remember any date in history, chronology, &c. a word is formed, the beginning of which being the first syllable, or syllables, of the thing sought, and the last syllable, or syllables, give the date.

In this art, letters stand for numbers: thus, the five vowels *a e i o u*, stand for 1, 2, 3, 4, 5; these combined, make dipthongs, as *au*, *oi*, *ou*; which represent the numbers, 6, 7, and 9: *e i*, as the first letters of the word, stand for *eight*.

Consonants being required as well as vowels, we have *b*, *d*, standing for 1 and 2, as the first two consonants: *t*, *f*, *s*, *n*, for *three*, *four*, *six* and *nine*; *l* stands for *five*, *p* for *seven*, *k* for *eight*, and *y* and *z* for a cypher or 0.

The whole method is explained in the following table.

a	*e*	*i*	*o*	*u*	*au*	*oi*	*ei*	*ou*	*y*
1	2	3	4	5	6	7	8	9	0
b	*d*	*t*	*f*	*l*	*s*	*p*	*k*	*n*	*z*

Here it is evident that *a* and *b* stand for 1; *e* and *d* for 2; *i* and *t* for 3; *o* and *f* for 4; *u* and *l* for 5; and so on. The letters are arbitrarily assigned, but we may observe, that *a* and *u* stand naturally for 6; because *a* stands for one, and *u* for five, and 1 + 5 = 6, for a similar reason *oi* stands for 7; and *ou* for 9; *l* stands for 5, being, as Dr. Grey observes, the Roman letter for 50, *p* stands for 7, as being the emphatic letter in the word *septem*, seven; and for a similar reason *k* stands for 8, ὀκτὼ the Greek for eight.

The foregoing table being committed to memory, with the explanations, the next thing to be done by the learner, is to obtain the habit of forming technical words to any combinations of figures.

Examples.

10	325	399	1921	1491	680	1810
az	*tel*	*toun*	*aneb*	*afna*	*seiz*	*akby*

It must be remembered that the *y* is pronounced broad to distinguish it from the *i*, and where it can be done conveniently, it is pronounced like the *w*, as *zyd*, is pronounced zwid, *typ*, twip, &c.

Suppose I wish to remember the date of the death of *Milton*, and know that it happened in the year 1674; I will make use of the first four letters of the name, and add to them the technical syllable *asoif* for the year, *a* being 1, *s* 6, *oi* 7, and *f* 4; thus the word is Milt*asoif*.

Where many cyphers come together, as 1,000, 1,000,000, *g* stands for 100; *th* for 1,000; *m* for 1,000,000, thus *ug* stands for 500; *eith* 8000; *um* 5,000,000, *augm* six hundred million. The same date or number may be expressed by different words according as vowels or consonants are used to represent the figures or begin the words.

pei	*tel*	*buf*	*alf*	*ni ola*
73	325	154, or	154;	93,451
oik	*idu*	*blo*	*alo*	*out olb.*

This variety gives scope for choice in the formation of words; so that such terminations and combinations may be made use of, as by their singularity will be best remembered, or which may be most adapted to the thing by any accidental relation or allusion. Thus the year of the world in which Eneas is supposed to have settled in Italy, is 2824, which number may be expressed by *ekef*, or *deido*, the latter is preferable to the former, because of the connection in the story between Eneas and Dido, and therefore the technical word Ene*deido*, is better than Ene*kef*.

Again, Inachus, king of Argos, began his reign in the year before Christ 1856, which, with a very small change in the spelling, may still possess the original sound, and yet point out the number required, as In*akus*.

To shew in what way artificial memory is applied to Chronology,

The ages of the world before the time of Christ, are divided by Chronologers into six periods; viz. the *first*, from the Creation to the Deluge; *second*, from the Deluge to the call of Abraham; the *third* epocha is the call of Abraham; the *fourth* the *Exodus*, or departure of the Israelites from Egypt; the *fifth*, the foundation of Solomon's Temple; the *sixth* is denominated from Cyrus, or the end of the Jewish captivity.

These six periods, or epochas, are expressed by the following line,

Cróth, Del*etok*, Ab*aneb*, Ex*afna*, Tem*bybe*, Cyr*uts*.

Before Christ.

1. CREATION of the world, - - - Cr-*othf*. 4004
2. The general DELUGE. - - - Del-*etok*. 2348
3. The Call of ABRAHAM, - - - Ab-*aneb*. 1921
4. Exodus, or the departure of the Israelites from Egypt - - - - - - Ex-*afna* } 1491
5. The foundation of Solomon's Temple, 1012. Tem-*bybe*
6. Cyrus proclaimed liberty to the Jews, 536. Cyr-*uts*

CR, denotes the creation; *o* stands for 4; *th* for thousand; and *f* for 4. DEL, the deluge, *etok*, 2348 according to the rules before mentioned; AB for Abraham; EX, the Exodus; TEM the Temple, and CYR, Cyrus.

The other general epochas, &c. are comprised in the following lines,

Troy-*abeit*, Olym-*pois*, Rom-*put*, et Æra Nabonas-*pop*.

Phil-*ido*, Contrac-*tud*, + Diocles-*eko*, Mahom-*audd*, Yez-*sid*.

7. The destruction of Troy - Troy-*abeit*. 1183
8. The first Olympiad. - - Olym-*pois*. 776
9. The building of Rome. - - Rom-*put*. 753
10. The æra of Nabonassar, Æranabonas-*pop* 747

11. The Philippic æra, or death of Alexander the Great. - - - - Phil-*ido* 324
12. The æra of Contracts. - Contrac-*tad*. 312
13. The Dioclesian æra. - - Diocles-*eko*. 284
14. The æra of the Hegira, or flight of Mahomet from Mecca to Medina. Mahom-*audd*. 622
15. The æra of Yezdegird, or Persian æra. Yez-*sid*. 632

The mark + signifies the birth of Christ, and all dates after it are reckoned from that period. This æra is used by Christians in all parts of the world, who began to reckon from it about the year 360, which, however, was too far distant from the age in which Christ lived, for chronologers to fix with certainty the true time of that important event.

An æra, as we have seen, is a date from which the reckoning begins by years: thus the Greeks reckon from the beginning of their Olympiads: the Romans from the building of Rome: the Syrians, and most of the Eastern nations, from the conquest of Babylon by Seleucus. The word *æra* is supposed to owe its origin to the Spaniards, it being usual with them in the time of Augustus, to write against any occurrence, the date with the following letters, A.E.R.A. that is, "Annus erat "Augusti." hence *aera*, *æra*."

TABLE

The three lines, therefore, which comprise all the general epochas, and æras, eclesiastical and civil, are as follow.

Cr*othf*, Del*etok*, Ab*aneb*, Ex*afna*, Tem*bybe*, Cyr*uta*.
Troy*ubeit*, Olym*puis*, Rom*put*, et Ær Nabonas*poqu*.

Phil*ido*, Contract*ad*, + Diocles*ekp*, Mahem*audd*, Yess*id*. - - - - - -

We shall now give two or three other examples, pointing out its utility in the study of history, as connected with the chronological history of states and kingdoms.

The Regal Table of England since the Conquest, and some of the most remarkable Princes before it.

	Bef. Christ.
CASIBELANUS chosen chief Commander by the *Britons* against the invasion of *Julius Cæsar* [Casibel *ud*] - - - - - - - - - -	52
	Aft. Christ.
Queen BOADICEA, the *British* heroine, being abused by the *Romans*, raises an army, and kills 7000 [Boad *aup*] - - - - - - -	67
VORTIGERN, who invited the *Saxons* to the assistance of the *Britons* against the *Scots* and *Picts* [Vortig *fos*] - - - - - - -	445
HENGIST the *Saxon*, who erected the kingdom of *Kent*, the first of the heptarchy [Heng *ful*] - - - - - - - - - -	455
King ARTHUR, famous for his powerful resistance and victories over the *Saxons* [Arth *laf*] - - - - - - - - - -	514
EGBERT, who reduced the heptarchy, and was first crowned sole monarch of *England* [Egbe *kek*] - - - - - - - - - -	828
ALFRED, who founded the University of *Oxford* [Alfre *kpe*] - - - - - - - - -	872
CANUTE the *Dane*, [Can *bau*] - - - - -	1016
Edward the CONFESSOR [Confes *fk*] - - -	1042
WILLIAM the Conq. [Wil-con *sau*] Oct. 14.	1066

		Aft. Christ.
William Rufus	[Ruf *koi*]	*Sept.* 9. 1087
Henry I.	[Hen *rag*]	*Aug.* 2. 1100
Stephen	[Steph *bil*]	*Dec.* 2. 1135
Henry the second	[Hensec *buf*]	*Oct.* 25. 1154
Richard I.	[Ric *bein*]	*July* 6. 1189
John	[J *ann*]	*April* 6. 1199
Henry the third	[Heth *das*]	*Oct.* 19. 1216
Edward I.	[Ed *doid*]	*Nov.* 16. 1272
Edvardus secundus	[Edse *typ*]	*July* 7. 1307
Edvardus tertius	[Edter *tes*]	*Jan.* 25. 1326
Richardus secundus	[Risec *toip*]	*June* 21. 1377
Henry the fourth	[Hefo *toun*]	*Sept.* 29. 1399
Henry the fifth	[Hefi *fad*]	*March* 20. 1412
Henry the sixth	[Hensi *fed*]	*Aug.* 31. 1422
Edvardus quartus	[Edquar *faus*]	*March* 4. 1460
Edward the fifth	} Efi-R *okt*, {	*April* 9. 1483
Richard III.		*June* 22. 1483
Henricus septimus	[Hensep *feil*]	*Aug.* 22. 1485
Henricus octav.	[Henoc *lyn*]	*April* 22. 1509
Edvardus sextus	[Edsex *los*]	*Jan.* 28. 1546
Mary	[Mary *lut*]	*July* 6. 1553
Elisabeth	[Els *luk.*]	*Nov.* 17. 1553
James I.	[Jam *syd*]	*March* 24. 1602
Carolus Primus	[Caroprim *sel*]	*March* 27. 1625
Carolus secundus	[Carsec *sok*]	*Jan.* 30. 1648
James II.	[Jam *seif*]	*Feb.* 6. 1684
William and Mary	[Wil *seik*]	*Feb.* 13. 1688
Anne	[An *pyb*]	*March* 8. 1701
George I.	[Geo *bo*]	*Aug.* 1. 1714
George II.	[Geosec *doi*]	*June* 11. 1727
George III.	[Geoter *sy*]	1760

Memorial Lines.

Cassibel *ud* Boad *aup* Vortig *fos* Heng *ful* & Arth *laf*

Egbe *kek* Alfre *kpe* Can *bau* Confes *fe* Wil-con *sau*
Ruf *koi* & Hen *rag*.——
Steph *bil* & Hensec *buf* Ric *bein* J *aun* Heth *das* &
Ed *deid*. - - - - -
Edse *typ* Edter *tes* Risec *toip* Hefo *toun* Hefi *fodque*.
Hensi *fed* Edquar *faus* Efi-R *ekt* Hensep *feil* Hen-
oc *lyn*. - - - - - -
Edsex *los* Mary *lut* Els *luk* Jam *syd* Carprim *sel*;
Carsec *sok* Jam *seif* Wil *seik* An *pyb* Geo *bo*—*doiesy*.

N. B. After *Canute* inclusive, one thousand is to be added to each. It was thought unnecessary to express it, it being a thing in which it is impossible that any one should mistake.

As another example we will take the Chronological Miscellanies since the Conquest.

	Aft. Christ.
Jerusalem regained from the *Turks*, and Godfrey of Bulloigne made king of it [Godbul *nou*] - - - - - - - - - - -	1099
The Inquisition first erected against the *Albigenses* [Inquis *ded*] - - - - - -	1222
The Confirmation of Magna Charta by king *Henry* III. [Chart *sel*] - - - - - - -	1225
Wat Tyler's Rebellion suppressed [Tyl *ika*]	1381
Jack Cade's Rebellion suppressed [Cade *fly*]	1450
The Mariner's Compass found out [Comp *atye*]	1302
Gunpowder invented in *Germany* by a monk [Gunp *atfo*] - - - - - - - - -	1344
The Invention of Printing [Prin *afon*] - -	1449
Christopher Columbus, a native of *Genoa*, discovers *Cuba* and *Hispaniola* [Colum *bone*] - - - - - - - - - -	1492

Martin Luther begins to preach in *Germany* against Indulgences, and other Errors of the Church of *Rome*, [Mar-luth *lap*] - - 1517

The Name of Protestants first began on Occasion of the Protestation of the *Lutherans* made against a decree of the chamber of *Spire* against them [Prot*alen*] - - - - 1529

The Smalcaldan League, or agreement made between the Protestants of *Germany* for their mutual defence, at *Smalcald* [Smalcal *los*] - - - - - - - - - - - - - 1540

The council of Trent began Dec. 13. [Tren-dec *at-alfu*] - - - - - - - - 1545

The Massacre of Protestants at Paris [Mas-par *aloid*] - - - - - - - - - - 1572

The United provinces, under the protection of *William* prince of *Orange*, throw off the *Spanish* yoke [Un-p *loin*] - - - - - - 1579

The Spanish Invasion [Sp- inv *ukk*] - - - 1588

The Gunpowder Treason [Powd *syl*] - - - 1605

The famous Rebellion at *Naples*, on occasion of the grievous Excises, headed by Massaniello [Masanel *sop*] - - - - - - - 1647

Oliver Cromwell usurps the Government of *England*, under the name of Protector [Crom *sli*] - - - - - - - - - 1653

The Island Jamaica in *America* taken by the *English* [Jamaic *sull*] - - - - - - - 1655

Cromwelli Mors [Crom-mor *suk*] - - - - - 1658

Gibraltar taken by the *English* [Gibra *pzo*] 1704

Memorial lines.

God-bul*aon* Chaut *adi* Inquis-*dal* Tyl *iku* Colle *fy*.
Comp *afus* Gump *ata* Prin *afen* *aique* Colum-*bone*.
Mar-luth *lap* Prot *alen* Smalcal *los* Tren-dec *at-alfu*.

Mas paraloid Un-ploin Sp-in *leik* Powd *sgl* Mainet
nel *sap*.
Crom *sli* Jamaic *eull* Crom-mor *suk* capta Gibra
pzo.

N. B. A thousand is to be added, as above, where it is not expressed.

We shall give an instance of the method of applying the *Memoria Technica* to other subjects; taking as an example, the

Distances of the Planets from the Sun.

	Miles.
The distance of Mercury from the Sun is	37.000.000
——————Venus ——————	66.000.000
——————Earth (Terra) ——————	95.000.000
——————Mars ——————	145.000.000
——————Jupiter ——————	493.000.000
——————Saturn ——————	903.000.000
——————Herschel ——————	1813.000.000

The words answering to these are,

Mer *ip*, Ven *sau*, Terra *nu*, Mars *afu*, Jup *oni*, Satur
nyt et Hers *akbi*.

In the same way, Dr. Grey, to whom we are indebted for this article, has applied the invention to Geography for the more ready recollection of the divisions of the world and the various countries of it: to the position of the several rivers, &c. Likewise to the knowledge of weights, measures, coins, &c. It may also be applied to any circumstance whatever, in which the ready recollection of numbers is expedient and useful. The following example taken from "the *Familiar Introduction to the Arts and Sciences*," will shew how the check numbers given in passing turnpikes may be easily remembered without being troubled with the tickets, "Suppose," says the author, "I ride from the City to Fulham by the City-road, Paddington, &c. if the numbers be as follows, then the adjoining words will assist the memory,

Old-Street turnpike	763.	Old-St. *oisi*
City Road	93.	Cit *mu*.
Battle-Bridge	540.	Bat. Br. *ufy*.
Paddington Road	889.	Pad *kein*.
Edgeware Road	39.	Edge *in*.
Hyde Park corner	481.	Hyde P. *oka*.
Fulham Road	27.	Ful. *ep*.

See Joyce's Introduction to the Arts and Sciences, p. 101.

MENSURATION, is the art of ascertaining the contents of superficial areas, or planes, and of solids: it is also applied to determine the lengths, heights, depths, or distances of bodies and objects. It may therefore include Longimetry or the art of measuring lines: Planimetry or the method of measuring surfaces: Stereometry or the art of measuring solids, which includes Gauging and TRIGONOMETRY; to the last article the reader is referred in the alphabetical arrangement.

Accessible lines are measured by applying to them some certain measure, as an inch, a foot, a chain, &c. a number of times repeated. Inaccessible lines must be measured by angles which are taken with a QUADRANT, which see. The measure of a plain figure is called its area, which determines the extension of bodies as to length and breadth. When we speak of the area of a figure, we refer to the measure of its surface without any regard to its thickness, and the surface of any body is measured by squares, as square inches, square feet, square yards, &c. that is, by certain figures whose sides are inches, feet, yards, &c. according to the following

TABLE.

144	square inches	make	1	square foot	
9	—	feet	—	1 —	yard
30¼	—	yards	—	1 —	pole
16	—	poles	—	1 —	chain
10	—	chains or 4 sq. rds.		1 —	acre
4840	—	yards	—	1 —	acre
640	—	acres	—	1 —	mile.

The area of a parallelogram, of any kind, is found by multiplying the length by the perpendicular height; thus the area of a paved yard, 80 feet long by 50 feet wide, is found by multiplying 80 by 50, equal 4,000 feet, the value of which, if the stone be reckoned at 1*s.* 3*d.* per foot, is 250*l.* Again the area of a triangle is found by multiplying the base by the perpendicular height, and dividing the product by 2, thus if the triangular hip of a house be 20 feet in height and the base be 30 feet long, then $\frac{20 \times 30}{2} = 300$ feet is the measure of the said hip. Now as slaters, tylers, &c. measure their work by squares of 100 feet each, a person will have to pay for three squares for slating such a triangular hip of a roof. It is evident that all right-lined figures, of whatever shape, may be divided either into parallelograms or triangles, and when so divided may be easily measured.

The circumference of a circle is found by multiplying the diameter by 3.1416: thus, if a circle be 45 feet in diameter, its circumference will be 3.1416 × 45 = 141.372 feet. And the area of a circle will be found by multiplying the square of the diameter by .7854, thus the area of a circle, whose diameter is 20 feet, is equal to 20^2 or $20 \times 20 \times .7854 = 314.1600$ equal to little more than 314 square feet.

A solid is a figure that has length, breadth, and thickness, and its measure is called its solidity, capacity, or contents. Solids are measured by cubes, whose sides are yards, feet, inches, &c. and the solidity, capacity or contents is said to be so many cubical inches, feet, &c.

TABLE.

1728	cubic	inches	make	1	cubical	foot
27	—	feet	—	1	—	yard
166⅜	—	yards	—	1	—	pole
64000	—	poles	—	1	—	furlong
512	—	furlongs	—	1	—	mile.

The solidity of any cubic figure is found by multiplying the area of the base by the height. Thus, if I enquire how many cubical feet there are in a block of stone, whose sides are 30 inches long, and what it weighs, supposing there are 16 feet in a ton,

I say $30 \times 30 = 900$ = area of the base

$900 \times 30 = 27000$ = cubical inches, and

$\frac{2.7000}{1728} = 15.5$ cubical feet which will, weigh nearly a ton.

Again to find the contents of a leaden water cistern, in cubical inches, and likewise in gallons. Suppose the cistern to be 5 feet long, 3 feet wide, and 2 feet deep

$5 \times 3 = 15$ feet = area of the base

$15 \times 2 = 30$ feet = cubic contents in feet

30 × 1728 = 51840 = cubic inches, and 282 inches being equal to one gallon, therefore

$$\frac{51840}{282} = 183 \text{ gallons.}$$

On this principle depends the whole business of gauging; and by similar means we can find the contents or capacity of any figure whatever. Thus to find the contents of a sphere, the rule is "Multiply the surface by one third of the radius, and the product will be the solidity;" or, what will come to the same thing, "Multiply the cube of the diameter by the decimals .5236." Example: What are the solid contents of the earth, supposing its diameter to be 8000 miles in length:

8000 × 8000 × 8000 = 512,000,000,000 and this last product multiplied by .5236 = 268,083,200,000 miles.

MENSURATION, *French system of.*

Long Measure.

Metres.		*Toises.*		
10,000,000	equal a quadrant of the meridian, or......	5,132,430		
100,000	100th part of a quadrant	51,324		
1,000	1 milliare or mile	513		
100	1 stadium, } agrarian measure {	51.3243		
10	1 perch, }	5.13243		
		Feet.	*Inch.*	*Lines.*
1	1 metre or rectilinear unit	3	0	11.44
1-10 or 0.1	1 decimetre or palm	0	3	8.344
1-100 or 00.1	1 millemetre	0	0	.443

Superficial Measure.

Square metres.		*Square feet.*
10,000	1 are, or superficial unit, (being a square the side of which is 100 metres in length) ...	94831
1000	1 deciare, or tenth of an are; a superficies 100 metres long, and 10 broad..................	9483.1
100	1, centiare	948.31

Measures of Capacity.

Cubic decimetres.		*Paris pints.*	*Paris bush.*
1000	1 cubic metre, or cade, or tun.................	1051.1-2	78.9
100	decicade, or setier, ...	105 1-7	7.89
10	centicade, or bushel	10.1-2	.789
1	cubic decimetre, or pint..........................	1.1-20	.0789

Weights.

Cub. dec. of water.		French pounds.			
1000	a cubic metre, or tale of water, called a bar, or millier	2044.4			
100	a decibar or 1-10 of a bar	204.44			
10	a centibar, or decal, or 1-100 of a bar	20.444			
		lb.	oz.	gros.	grains.
1	1 grave or pound	2	0	5	49
.1	1 decigrave, or 1-10 of a grave	0	3	2	[illegible]
.01	1 centigrave, or dram, or 1-100 of a grave	0	0	2	44.41
.001	1 gravet, or maille, the weight of a cubic centimetre of water	0	0	0	18.841
.0001	1 decigravet, or grain	0	0	0	1.8841
.00001	1 centigravet	0	0	0	0.18841

Mephitic, in natural history and chemistry, a term equivalent to *noxious*, or *poisonous*, and applied generally to vapours of that description. The gases, now called *hydrogen* and *azote*, are by some authors styled *mephitic airs*.

Mercator's-*chart*: is a projection of the surface of the earth in plano; so called from Mercator, a Flemish Geographer, who first published maps of this sort in 1556. In this chart or projection, the meridians, parallels, and rhumbs, are all straight lines, the degrees of longitude being every where increased so as to be equal to one another, and having the degrees of latitude also increased in the same proportion; namely at every point on the globe, the degrees of latitude, and of longitude, or the parallels, are increased in proportion of radius to the sign of the polar distance, or co-sine of latitude, or in the proportion of the secant of the latitude to radius, a proportion which has the effect of making all parallel circles to be represented by parallel and equal right lines, and all the meridians by parallel lines also, but increasing infinitely towards the poles.

Mercury, the name of a fluid metal of a white colour, exactly resembling that of polished silver. Mercury is fluid because of its great readiness to imbibe caloric. It becomes solid, in which state it is malleable, at the temperature of — 39°; and boils at that of 600°. Its specific gravity is twice that of iron. Mercury is not only found in cinnabar, and other ores, but it is sometimes met with in its pure and fluid state, lodged in the accidental cavities of hard stone; so that when the workmen who search for its ore, accidentally break into these cavities, it runs out like water.

At the common temperature of the atmosphere, mercury is always in a state of fluidity, and in this respect it differs from all other metals excepting those discovered by Professor Davy, within the last four years. The vapour of mercury is invisible and elastic like common air. Mercury combines with the greater number of metals, and these combinations are denominated amalgams. When very pure, mercury is not oxydized at the common temperature of the atmosphere, but may be converted into an oxyde by boiling. A combination of oxyde of mercury and muriatic acid, obtained by sublimation, is called muriated mercury, or corrosive sublimate. Calomel is composed of the same substances, but with a larger proportion of mercury.

Mercury, in Astronomy, is a very small planet that emits a bright light, though on account or his vicinity to the sun it is seldom seen by the inhabitants of the earth. He never rises so much as two hours before the sun, nor sets so much after him. On account of its rapid motion, the

Greeks called this planet after the name of the swift messenger of the Gods, and represented it by the figure of a youth with wings at his head and feet; from whence is derived the astronomical character ☿ still in use in books of science. The mean distance of Mercury from the sun, is to that of the earth from the sun as 387 to 1000, or about 36 millions of miles. See SOLAR *system.*

MERIDIAN, in astronomy, a great circle of the celestial sphere passing through the poles of the world, and also the zenith and nadir, crossing the equinoctial at right angles, and dividing the sphere into two equal parts, or hemispheres, the one eastern and the other western. In geography the meridian is a great circle passing through the poles of the earth, and any given place whose meridian it is, and it lies exactly under, or in the plane of the celestial meridian. These meridians are various, and change according to the longitude of places, so that their number may be said to be infinite, for all places from east to west have their meridians. The *first* meridian by the ancients was usually placed through the place farthest to the west that was known. But modern geographers usually assume the meridian of the place where they live or the capital of their country, or its chief observatory, for a first meridian, and from thence reckon the longitude of places, east and west.

MERIDIAN *line*, an arch, or part of the meridian of the place terminated each way by the horizon. Or it is the intersection of the plane of the meridian of the place with the plane of the horizon, often called a north and south line, because its disection is from north to south. There are many methods of drawing a meridian line. The most simple is the following: On an horizontal plane, describe several concentric circles A B, a b, &c. Plate Miscellanies, fig. 28, and on the common centre C erect a stile or gnomon of about 12 inches in length. Towards the 20th of June, between the hours of 9 and 11 in the morning and 1 and 3 in the afternoon observe the points A, a, B, b, &c. in the circles where the shadow of the stile terminates. Bisect the arches A B and *a b*, in D, *d*. If then the same right line D E, bisect all these arches, it will be the meridian line sought.

Merops, the bee-eater, a genus of birds of the order Picæ, of which there are twenty-six species. The Merops apiaster, or common bee-eater, is found in many countries of Europe, but never in Great Britain. It is particularly fond of bees, but will eat various other insects; many of which it seizes like the swallow, on the wing. In the island of Candia, these birds are often taken by boys in the same manner as swallows, by a line, with an insect attached to a hook at the end of it.

Metal, in natural history and chemistry, the name of a class of simple bodies, of which it is observed that they possess a lustre; that they are opaque; that they are fusible, or may be melted; that their specific gravity is greater than that of any other bodies yet discovered; that they are better conductors of electricity than any other body; that they are malleable, or capable of being extended and flattened by the hammer; and that they are ductile or tenacious, that is, capable of being drawn out into threads or wires.

All metals have a greater or less aptness to imbibe oxygen; and this is the cause of the production of what is commonly called *tarnish*, or *rust*, or calx; but which modern chemists denominated *oxyde*. This substance is always a compound of metal and oxygen. The common brown oxyde of iron is well known; and the fine blue colour upon the surface of steel is also an oxyde artificially procured; that is, by heating the metal, which disposes it to imbibe the oxygen of the atmosphere. At present the number of metals amounts to 21; they are sometimes divided into perfect, imperfect, and semi-metals. But this distinction being pretty well exploded, they are more conveniently arranged under three classes, viz. 1. Metals which are malleable. 2. Such as are brittle and easily fusible. 3. Those that are brittle and fusible with difficulty.

Malleable Metals.—Platinum, hitherto found only in South America, heavier than gold, white, extremely tenacious, very ductile and malleable, fusible by a strong heat. It is always found in small scales, in a metallic state, and combined with iron.

Gold, of a yellow colour, found in many parts of the globe; sometimes pure, or mixed with a small proportion of silver, copper, or iron; but most commonly disseminated through the veins of other metals. It surpasses every other substance in ductility and malleability. An ounce of gold leaf upon silver wire is capable of being extended more than 1300 miles in length.

Silver, next to gold and platinum, the most perfect, fixed, and ductile of all metals, harder and more sonorous than gold, and fusible with a less degree of heat. It may be beat into leaves $\frac{1}{160000}$th inch thick, and a grain of it may be drawn out into wire 400 feet in length. It is found in quartz, limestone, hornstone, &c. combined with the ores of other metals.

Mercury, or quicksilver, is of a white brilliant colour, fluid at the common temperature of the atmosphere. It abounds in Europe, South America, China, and occurs most commonly in schistus, lime-stone, and sand-stone.

Copper, the hardest and most elastic of metals, except iron; commonly found in rocks of hornblende, schistus, and quartz. It is considerably ductile, malleable, sonorous, fusible, and destructible by fire. Native copper occurs sometimes in masses; sometimes in plates of various forms, and sometimes crystallized in cubes. It is the basis of several metals, as brass, bell-metal, prince's metal, white copper, &c.

Iron, the hardest, most abundant, and most useful of all metals. Its properties are well known, is hard, fusible, malleable, combustible, and magnetic.

Tin, the brightest of malleable metals, and least ductile, except lead. It is of a white colour and a disagreeable taste, soft, easily fusible, elastic, and sonorous. The only tin mines in Europe are those of Cornwall, Devonshire, Saxony, Bohemia, Silesia, Hungary, Gallicia. Bell-metal is three parts copper and one of tin.

Lead, a pale metal, soft, flexible, not ductile nor sonorous in any considerable degree; malleable, fusible, and capable of combining with most of the metals. By means of heat it is formed into red lead, and by the steams of vinegar into white lead. Pewter is composed of three parts of tin and one of lead.

Nickel, of a white colour, softer than iron, rendered brittle by heat, malleable when cold, and like iron attracted by the magnet. It has been hitherto found in small quantities in Britain, France, Germany, &c. and commonly accompanies cobalt.

Zinc, when pure, of a brilliant white colour, composed of a number of thin plates adhering together. It is fusible, but not ductile, nor so malleable as the metals already mentioned. It generally accompanies lead ores. Three parts of copper and one of zinc form brass. Three parts of zinc and four of copper form pinchbeck, or prince's metal.

Brittle and easily fusible Metals.—Bismuth, composed of broad brilliant plates of a yellowish colour adhering to each other. It is fusible, but not ductile, and loses its lustre when exposed to the air. It combines with almost all the metals, often accompanies cobalt, and is found in England, Germany, France, Sweden, &c. Dissolved in nitrous acid, it forms a paint called pearl-white.

Antimony, a ponderous brittle mineral, of laminated texture, and a greyish white colour, fusible, and easily reduced to a fine powder. It combines with most metals; and is found abundantly in many countries of Europe. Sixteen parts of lead and one of antimony form an alloy for printers' types.

Tellurium, a metal of a bluish white colour, intermediate between zinc and lead, brilliant, fusible, easily reduced to powder, and the most volatile of all the metals, except mercury and arsenic. It is found in Transylvania.

Arsenic, a brittle compact substance of a bluish white colour, volatile, and extremely combustible. It has a sharp acrid taste, when heated it emits a strong odour of garlic, and is a most virulent poison. It combines with most metals, rendering them more brittle and fusible.

Metals brittle and fusible with difficulty.—Cobalt, a heavy and grey coloured mineral, almost without taste or smell, brittle, and easily reduced to powder, attracted by the magnet, somewhat malleable when hot, fusible, and capable of combining with most metals.

Manganese, a very hard, brittle, dark grey, or brown, mineral, of a granular texture, with a good deal of brilliancy, and fusible by an intense heat. It combines with many of the metals: when reduced to a powder it is attracted by the magnet, and has been long known and used in the manufacture of glass.

Tungsten, that is, ponderous stone, found in Sweden, one of the hardest of metals, of an opaque white colour, brittle, fusible, not attracted by the magnet.

Molybdenum, composed of scaly particles adhering slightly together, of a colour resembling lead, and almost infusible.

Uranium, found in Saxony, of a dark grey colour inclining to brown, opaque, tolerably hard, fusible by a strong heat. On being pounded it yields a black powder. Nothing is known concerning its malleability or alloys.

Titanium, found in Cornwall, of an orange red colour, with a good deal of lustre, but not fusible by any heat that can be produced. Neither its hardness nor malleability has been ascertained.

Chromium, found near Ekaterinbourg in Siberia, brittle, of a white colour, with a shade of yellow. It is fused with difficulty; but few of its properties are known.

METAL, *Bell*, see BRONZE.

METAL, *Princes*, see ZINC.

METALLURGY, the art of working metals, particularly as fusible bodies; comprehending that of *smelting*, or fluxing the metal from the state of the ore.

METAPHOR, see RHETORIC.

METAPHYSICS, or ONTOLOGY, that branch of philosophy which inquires into spiritual existence. With respect to animals, it takes them up where physiology leaves them; and, proceeding higher, ventures to speak of Deity itself.

METEOR, in natural history, a transitory body, or appearance of a body, appearing in the atmosphere, and caused by the action of the electric fluid upon other matters. Under the denomination of meteors are comprehended lightning, winds, rains, &c.

METEOROLOGY, is the science of studying the phenomena of the atmosphere. These phenomena may be classed under five distinct heads, viz. the alterations that occur in the weight of the atmosphere; those that take place in its temperature; the changes produced in its quantity by evaporathaw, and rain, and those which arise from electric and other causes. The majority of meteorological alterations depends on chemical changes and combinations; and if we were accurately acquainted with the peculiarities of the substances which form the component parts of the atmosphere, nothing would be more easy than to explain the result of their mutual action; but this not being the case we must be contented with probabilities. See RAINY WEATHER, *rules for judging of*; WIND; &c.

METEORS, or fire balls, have been frequently observed in the atmosphere. The elevation of some of these bodies above the earth is astonishingly great; their motion extremely rapid; and their diameter in some instances exceeding 1,000 yards. Dr. Halley, in March 1719, observed a remarkable one, whose height he computed to have been about 70 miles, its diameter more than 2½ mile, and its velocity about 850 miles in a minute. Another appeared in August 1783, whose diameter was at least equal to that of the former, whose velocity was 1000 miles in a minute, and its height above the earth not less than 90 miles. These bodies generally disappear on a sudden, and with a loud noise. Heavy stony masses, composed of the same ingredient, resembling each other, and differing completely from every other stone, are said to fall to the earth at the time of the explosion. Many well authenticated instances of the falling of such stony substances have been recorded. When discovered soon after their fall, they are always hot, and buried to some depth under ground. Their size varies from a few ounces to several tons; and in many cases they smell strongly of sulphur. The outer surface is a rough black crust, chiefly of oxide of iron; the interior part is composed of four substances, viz. small spherical bodies of greyish brown colour, fragments of a peculiar pyrites, grains of iron, and a grey cement of an earthy composition. These masses are probably concretions formed in the atmosphere: but, concerning the manner in which they are composed, and the splendour of their appearance in a region where the air is 300,000 times rarer than the air near the earth's surface, we presume not to offer a conjecture.

Methodists, in church history, an extremely numerous sect of Christians; found in all parts of the United Kingdom, and in most parts of America. Mr. John Wesley, and Mr. George Whitfield, were the founders of modern methodism. The followers of Mr. Wesley are usually regarded as the true methodists, their distinguishing tenets are: "Salvation by Faith in Christ: perceptible and sometimes instantaneous conversion; and an assurance of reconciliation to God, with which, they say, the new birth, or being born again is inseparably attended." The Wesleyans at their conference in 1810 reckoned upon the number of 313,860 persons attached to their system.

Mezzotinto, a manner of representing figures on copper, so as to form prints, in imitation of shadowing in Indian ink. Take a well-polished copper-plate, and beginning at the corner, rake or furrow the surface all over with a knife, or instrument made for the purpose, first one way, and then the other, till the whole is of a regular roughness, without the least smooth part to be seen: in which state, if a paper were to be worked off from it at the copper-plate press it would be black all over. When this is done, the plate is rubbed with charcoal, black-chalk, or black-lead, and then the design is drawn with white chalk; after which the out-lines and deepest shades are not scraped at all, the next shades are scraped but little, the next more, and so on, till the shades gradually falling off, leave the paper white, in which places the plate is perfectly burnished. By an artificial disposition of the shades, and different parts of a figure on different plates, mezzotintos are printed in colours, so as to represent actual paintings.

MICAH, a canonical book of the Old Testament written by the prophet Micah. The object of this work is this: the writer censures the reigning vices of Jerusalem and Samaria, and denounces the judgments of God against both kingdoms. He likewise foretells the confusion of the enemies of the Jews, the coming of the Messiah, and the ultimate success of the church.

MICROMETER, an astronomical machine, which, by means of a screw, serves to measure extremely small distances in the heavens.

MICROSCOPE, an optical instrument, by means whereof very minute objects are represented, exceedingly enlarged, and are viewed very distinctly according to the laws of refraction, or reflection. See OPTICS.

MIDSHIPMAN, in the British navy, a sort of cadet, appointed by the captain of a ship of war, to second the orders of the superior officers; and assist in the necessary business of the vessel, either aboard or ashore. A ship of the first rate carries twenty-four midshipmen. No person can receive a commission, without having served a certain number of years in the royal navy in this capacity, unless he has been mate of a merchant-man, and experienced years of actual service, either in the navy, or in the merchant service.

MILE, *mille passus*, a measure of length containing eight furlongs, or 1760 yards: this is the English mile. It is different in different countries; thus the

	Yards.
Mile of Russia	1100
——— Italy	1467
——— Scotland and Ireland	2200
——— Poland	4400
——— Spain	5028
——— Germany	5866
——— Sweden and Denmark	7233
——— Hungary	8800

MILITIA, in general, denotes the body of soldiers, or those who make profession of arms. In a more restrained sense, militia denotes the trained bands of a town or county, which are armed for their own defence; so that, in this sense, militia stands opposed to regular troops. For the direction and command of the militia, the king constitutes lords-lieutenants of each county.

MILK, an animal fluid, formed from the chyle. This fluid, which is only produced from the body on occasion of suckling, is notwithstanding, constantly formed. It is the proper sustenance of the animal itself; all the nutritive parts of food being formed into chyle, and chyle into milk. The milk of cows, sheep, goats, and mares, is manufactured into various species of food; particularly butter and cheese. Butter and cheese are artificially made, the former by churning, and the milk which remains after the butter has been separated, or as it is called, the butter milk, has all the properties of milk from which the cream has been separated: Cheese is obtained by the addition of rennet to the milk, and the quality of the cheese depends upon the quantity of cream that remains in the milk. Milk may be fermented, and it will then yield a vinous intoxicating liquor.

Mill, is a machine, which by means of any adequate force, as steam, water, wind, or animal exertion, acquires such an additional power as enables the machinery to act with increased effect, and with the requisite regularity.

Mimosa, a genus of plants of the polygamia monoecia class and order, of which there are eighty-five species known. The Mimosa sensitiva, sensitive plant, rises with a slender woody stalk seven or eight feet in height, armed with thorns: the principal stalk has many heads of flowers on the upper part, for more than a foot in length: this as well as the branches is terminated by heads of flowers, the leaves move but slowly when touched, but the foot-stalks fall when they are pressed hard. "Naturalists," says Dr. Darwin, "have not explained the immediate cause of the collapsing of the sensitive plant; the leaves meet and close in the night, during the sleep of the plant, or when exposed to much cold in the day-time, in the same manner as when they are affected by external violence, folding their upper surfaces together, and in part over each other like scales or tiles, so as to expose as little of the upper surface as may be to the air; but do not, indeed, collapse, quite so far; for when touched in the night during their sleep, they fall still further; especially when touched on the foot-stalks, between the stems and the leaflets, which seems to be their most sensitive or irritable part. Now as their situation after being exposed to external violence resembles their sleep, but with a greater degree of collapse, may it not be owing to a numbness or paralysis consequent to too violent irritation, like the fainting of animals from pain or fatigue? A sensitive plant being kept in a dark room till some hours after day break, its leaves and leaf-stalks were collapsed as in its most profound sleep, and on exposing it to the light, above twenty minutes passed before the plant was thoroughly awake, and had quite expanded itself. During the night the upper surfaces of the leaves are oppressed; this would seem to shew that the office of this surface of the leaf, was to expose the fluids of the plant to the light as well as to the air."

Mind, in metaphysics, that part of the animal composition which is perceptible only in its operations, it is said to be the instrument of thought.

Mineral, in natural history, is used, in general, for all fossile bodies, whether simple or compound, dug out of a mine.

Mineral *alkali*. See Soda.

Mineral *waters*, in medicine, all those wherein any medicinal virtues, besides those of common water, are found. Mineral waters are of various kinds; but they are considered under the general titles of chalybeate, opening, and alterative.

All mineral waters may be arranged in four classes, viz. the acidulous, saline, sulphureous, and ferruginous waters. The *acidulous* are those in which the carbonic acid gas abounds, they are known by their sharp taste, and the facility with which they boil and afford bubbles by simple agitation; they redden the tincture of turnsole, precipitate lime-water and alkaline sulphurets. Seltzer water is of this kind, and there are many other places on the continent where they are to be met with, and where indeed they have obtained much reputation. *Saline* waters are such as contain a sufficient quantity of neutral salt to act on the animal frame; such are the Epsom waters. *Sulphureous* waters are those that appear to contain sulphur, or at least something that possesses many of the properties of sulphur, as the smell, and the effect of discolouring silver. These have been divided into those that contain a small quantity of alkaline or sulphureous sulphur; and those which are impregnated with sulphuric hydrogen gas. The waters of Bareges belong to the first order; those of Aix-la-chapelle to the second. *Ferruginous* waters contain iron; they are also called chalybeate. These are all used in medicine, as are likewise the warm and cold water naturally and artificially so; the waters at Bath and Bristol are of the warm kind.

MINERALOGY is that branch of natural history which makes us acquainted with the properties and relations of minerals. What is denominated *Oryctognosie* is that branch of mineralogy which makes us acquainted with minerals in their natural order, under fixed denominations, and by well ascertained characters. By means of chemical analysis, we become familiarized with the quality and quantity of their constituents, and economical mineralogy teaches the different uses to which they may be applied.

Simple minerals are arranged in classes, genera, species, and subspecies. The highest term, and that from which these divisions spring, is *kingdom*. The second, or *class*, is founded on the fundamental constituent parts. Of these there are four: 1. the earthy: 2. the saline: 3. the inflammable: 4. the metallic: these form the four great natural classes. The *genus* is characterized by the predominating earthy, saline, inflammable or metallic matter. The *species* include all those minerals that agree in external characters and external composition. A species is composed of subspecies, or varieties which differ in the individual characters, as lustre, fracture, hardness, &c.

The class of *earthy* minerals is distinguished from the others by its being in general not remarkably heavy, brittle, possessing usually white or light colours, disposed to crystallize, uninflammable in a low temperature, insipid and inodorous. It is usually placed first in a system of mineralogy, as constituting the great crust of the earth, and being the repository of the minerals of other classes. This class is by Mr. Jameson, divided into six genera, denominated the flint; the clay; the talc; the calc; the barytes, and the strontian genus.

The class of *saline* minerals is characterized by being moderately heavy, soft, possessing some degree of transparency, being white and sapid

In this class, according to Werner, there are four genera, viz. carbonates, muriates, nitrates, and sulphates.

The characters of the *inflammable* class are lightness, and brittleness: the individuals in this class are mostly opaque, scarcely ever crystallized, and they do not feel cold. This class includes three genera, viz. sulphur, coal, and graphite.

The *metallic* class contains many genera; they are characterized by opacity, and great specific gravity: they generally possess a peculiar lustre, are tough, and in some degree malleable; cold, and not easily inflamed. The genera of this class are so arranged that those which possess the properties of the class in the highest degree are placed first; thus, platina possesses the metallic qualities in the highest degree, and is placed at the head of the class: next comes gold, then mercury, on account of its great specific gravity, afterwards silver, copper, iron, &c. &c.

The characters employed in the description of minerals by Werner, and other mineralogists who adhere to his system, are divided into five classes, viz. 1. The external, including colour, shape, lustre, fracture, hardness, weight, &c. 2. Chemical, or those which are discovered by analysis. 3. Physical properties, discovered by the magnet, friction, and heat. 4. Geognostic characters, or the occurrence of one mineral with another: thus native arsenic frequently occurs with red orpiment, but never with red lead ore: this, therefore serves as an excellent character for distinguishing these two minerals in doubtful cases. 5. Geo-graphic character, which is determined from the local situation of a mineral. See JOYCE's Letters on Experimental Philosophy.

MINISTER *of state*, a person to whom a sovereign prince intrusts the administration of the government.

MINISTER, in church ceremonies, one who preaches, performs religious worship in public, administers the sacraments, &c. See BISHOP, DEACON, &c.

MINT, in modern history, a place where the national coinage of Britain and Ireland is performed. In minting, or coining money, the first process is that of melting metal in crucibles and pouring it into moulds, where it is formed into plates. The plates are afterward passed through a flatting-engine, by which their thickness is regulated. They are next, with the assistance of an instrument called a trepan, cut into planchets, or circular pieces. The planchets are then duly weighed; and, being boiled, and made clean, conveyed to the mill, by which their edges are marked. Coins, of sufficient thickness, sometimes receive inscriptions on their edges; but others only a small pattern, commonly called the *milling*. The coining-mill stamps the effigy, symbol, or legend required. This machine is so expeditious, that, with the labour of one man, twenty thousand planchets may be stamped in a day. The coin, thus completed, is again weighed before it passes into currency.

Medals, the relief of which is higher than that of coins, are not stamped without additional toil. Instead of a single stroke, the blow is repeated fifteen or twenty times; between each of which the planchet is taken from the dies, and heated. Medallions, the relief of which is still higher, are usually cast in sand, and only perfected by the machine.

In the earlier stage of the art, the impression was given by the hammer; the invention of the machine above alluded to, is attributed to a Frenchman, named Brucher, and dated, A. D. 1553; but an engine, of vastly greater perfection, belongs to a celebrated mechanician of the present day, Mr. Boulton.

Miracles; on these depend the evidence in favour of revealed religion. Dr. Clark defined a miracle to be 'a work effected in a manner different from the common and regular method of Providence, by the interposition of himself or some intelligent agent superior to man: but Mr. Hugh Farmer, who understood the subject better than any previous writer, maintains, that miracles are neither the effects of natural causes, nor of superior created intelligences acting from themselves alone; but that they are always to be ascribed to a divine interposition; i. e. that they are never wrought, but either immediately by God himself, or by such other beings as he commissions and empowers to perform them. In proof of this proposition, he alleges, that the same arguments which prove the existence of superior created intelligences, do much more strongly conclude against their acting out of their proper sphere. Further, the supposition of the power of any created agents to work miracles of themselves in this lower world, is contradicted by the observation and experience of all ages; there being, in fact, no proper evidence of the truth of any miracles, but such as may be fitly ascribed to the Deity. Moreover, the laws of nature being ordained by God, and essential to the order and happiness of the world, it is impossible God should delegate to any of his creatures a power of working miracles, by which those divine establishments may be superseded and controlled. Besides, the ascribing to any superior beings, God excepted, and those immediately commissioned by him, the power of working miracles, subverts the foundation of natural piety, and is a fruitful source of idolatry and superstition.

Mirror. See Optics.

Mischnah, the code or collection of the civil law of the Jews. The Jews pretend that when God gave the written law to Moses, he gave also another not written, which was preserved by tradition among the doctors of the synagogue, till through their dispersion, they were in danger of departing from the traditions of their fathers, when it was judged proper to commit them to writing.

Mizen, in the sea-language, is a particular mast or sail. The mizen-mast stands in the sternmost part of the ship.

Mohair, in commerce, the hair of a kind of goat, frequent about Angora, in Turkey; the inhabitants of which city are all employed in the manufacture of camblets made of this hair.

Mohammedans, those who believe and practise the religion of Mohammed. The position on which Mohammed erected the superstructure of his religion, was, that there has been, from the beginning of the world, but one true orthodox belief, which consists in acknowledging one only true God, and obeying such of his messengers and prophets as he has from time to time sent into the world, to reveal his will to mankind. Upon this foundation he set about to extirpate idolatry, which was the religion of the Arabs, his countrymen, and to reform the other abuses crept into religious worship. See KORAN.

MOLASSES. See SUGAR.

MOLLUSCA, in natural history, the name of the second order of the Linnean class *Vermes*. They are naked, furnished with tentacula, or arms, for the most part inhabitants of the sea, and by their phosphorescent quality illuminate the dark abyss of the waters.

MOMENTUM, in mechanics, signifies the same with impetus, or quantity of moving body, which is always equal to the quantity of matter, multiplied into the velocity.

MOMORDICA, a genus of plants, of which there are eight species, the most remarkable of which is the Momordica balsamina, common balsam apple. This is a native of India, and is famous for curing wounds: the inhabitants cut open the unripe fruit, and then infuse it in sweet oil, till the oil becomes red: in this state, when applied to wounds, they are readily healed.

MONARCHY. See KING.

MONASTERY, a convent, or house, built for the reception and entertainment of monks, mendicant friars, and nuns. Monasteries are governed by different rules, according to the different regulations prescribed by their founders. The first regular and perfect monasteries were founded by Pachomius, in Egypt. Saint Augustin being sent into England, by St. Gregory the Pope, in the year 596, to convert the English, he, at the same time, introduced the monastic state.

Monk, a person who wholly dedicates himself to the service of religion, and resides in some monastery, under the direction of particular statutes and rules.

Money, a piece of matter, commonly metal, to which public authority has affixed a certain value and weight, to serve as a medium in commerce. See Coin, Exchange, and Mint.

Monogram, a character or cypher, composed of one, two or more letters, interwoven, being an abbreviation of a name, antiently used as a seal, badge, arms, &c. printers, engravers, &c. formerly made use of monograms to distinguish their works. See Rees' New Cyclopædia.

Monsoon. See Wind.

Month, in chronology. See Time, Year.

Moon, in astronomy, a satellite, or secondary planet; as that always attendant on the earth. See Satellite. The distance of this moon from the earth is determined to be about 239,318 miles; its diameter 2192 miles; and its bulk to that of the earth, as 1 to 48.

Moravians, see Unitas *Fratrum*.

Mordant, in dying. When a substance to be dyed has little or no attraction to the matter on which the colour depends, so as either not to be capable of abstracting it from its solvent, or of retaining it with such force as to form a permanent dye, then some intermediate substance is used, which acts as a bond of union between them: this substance is called a mordant.

Morocco, *maroquin*, in commerce, a fine kind of leather, prepared of the skin of an animal of the goat kind, in the countries of the Levant.

MORTALITY, *bills of*; registers of the number of deaths or burials in any parish or district: these were established at the time when the plague made great ravages in London, and they have been continued from the convenience found in ascertaining by them, the precise time of the birth or death of individuals, and for the information they furnish respecting the rate of human mortality, and the state of population. The London bills of mortality are founded upon the reports of the sworn searchers, who view the body after decease, and deliver their report to the parish clerk. The parish clerks are required to make a weekly return of burials with the age and disease of which the person died; a summary is published every year.

MORTAR-PIECE, a short piece of ordnance, considerably thick and wide; serving to throw bombs, carcasses, fire-pots, and other warlike preparations. The use of mortars is thought to be older than that of cannon; they having been employed, in the wars in Italy, to throw stones and balls of red-hot iron, long before the invention of bombs; which, according to Blondel, were first thrown at the siege of Wachtendorch, in Guelderland, in 1688.

MORTGAGE, in law, a pledge or pawn of lands, tenements, &c. for money borrowed; so called, because, if the money is not paid at the day, the land dies to the debtor, and is forfeited to the creditor. The common method of making a mortgage is by lease for a long term of years, wherein a peppercorn rent has been usually reserved, and it may be made by assignment for a term, and by lease and release.

Mother *of pearl*, a beautiful white enamel, which forms a part of the oyster-shell. See Pearl.

Mortmain, in law, the alienation of lands or tenements to any religious house, corporation, or fraternity, and its successors. Lands alienated in mortmain are different from others, for they never revert to the donor, or to any temporal or common use; on which account, by such alienation, the lords lose their escheats, and many services that were previously due to them; as bodies politic never die, nor can perform personal service, nor commit treason, or felony.

Mosaic, *or* **Mosaic-work**, an assemblage of little pieces of glass, marble, precious stones, &c. of various colours, cut square, and cemented on a ground of stucco, in such a manner as to imitate the colours and gradations of painting.

Motacilla, see Nightingale.

Motion, the continued and successive change of place. There are three general laws of motion: 1. That a body always perseveres in its state of rest, or of uniform motion in a right line, till by some external force it be made to change its state: for as a body is passive in receiving its motion, and the direction of its motion, so it retains them, or perseveres in them without any change, till it be acted on by something external. 2. that the change of motion is proportional to the force impressed, and is produced in the right line in which that force acts. 3. That action and re-action are equal with opposite directions, and are always to be estimated in the same right line. See Mechanics.

Muggletonians, in church history, a sect which arose in England, about the year 1657; so denominated from their leader Ludowic Muggleton, who with his associate Reeves, asserted that they were the two last witnesses of God, that should appear before the end of the world.

Mule, see Horse.

Murder, in law, the wilful and felonious killing a person from premeditated malice; provided the party wounded or otherwise hurt, die within a year and a day after the fact be committed. See Homicide.

Muriates, in chemistry, a genus of salts formed of the muriatic acid with certain bases: the most important of these is the muriate of soda, or common salt. It exists abundantly in nature, immense quantities of it being dug out of the earth, which requires only to be reduced to powder. In this state it is called rock salt. It is also one of the constituents of sea-water, which when evaporated yields the salt in crystals.

Muriatic *acid*, in chemistry, is obtained by decomposing common salt: the soda is obtained pure, and the acid goes off in a state of gas.

Mus, the rat, in natural history, a genus of the mammalia, of the order glires. There are forty-six species, of which the following may be noted; viz. Mus lemmus, or the leming. These animals are sometimes five inches long in the body, and in some countries (as Siberia) only three. They abound in the mountainous districts of Norway and Lapland. In their general habits they are by no means particularly social; but reside in a dispersed manner, without skilfully contrived habitations, or storing up in magazines. On certain occasions, however, they descend from their elevated situations into the plains, in innumerable and formidable multitudes. Their direction is always in a straight line; from which nothing induces them to deviate but the absolute impossibility of proceeding in it. Their track is visible by the destruction of herbage which attends it, the grass being devoured to its extreme roots, and their course exhibiting, instead of the greenness of vegetation, the brownness of a fallow. These migrations happen at irregular periods, generally after an interval of some years; and the perseverance and intrepidity with which they are conducted are matter of astonishment. If attacked by men, they will spring at the legs of the assailants, and with great difficulty can be made to quit their hold. Thousands are destroyed in these progresses by birds of prey, and often the most formidable and fatal conflicts occur among themselves.

MUSCA, the fly, a genus of insects of the order diptera, of which there are said to be a thousand species. They are divided into sections, according as they have or have not feelers. The larvæ in the different tribes of flies differ far more in habit than the complete insects, some being terrestrial, and others aquatic. Those of the common kinds are emphatically distinguished by the title of maggots; and spring from eggs deposited on various putrid substances. Several of the aquatic kinds are of singularly curious formation, and exhibit wonderful examples of the provision ordained by nature for the preservation of even the meanest of animals. The general form of the pupa is that of an oval, differently modified, according to the species, and formed by the external skin of the larva. Some species cast their skin before their change into the pupa state. One of the most remarkable species is Musca chamæleon, which is a large black fly, with a broad, flattish abdomen, having the sides of each segment yellow, forming so many abrupt semi-bands across that part. It proceeds from an aquatic larva, of very considerable size, measuring 2 inches and a half in length, which is common in stagnant waters during the summer months, and passes into its chrysalis state without casting its skin, which dries over it, so as to preserve the former appearance of the animal in a more contracted state.

Among the bristly flies is the Musca carnaria, or common blow-fly, which deposits its eggs on animal flesh, either fresh or putrid. The larves, or maggots, hatch in the space of a few hours, and when full grown, which happens in eight or ten days, they are of a yellowish colour, with a slight tinge of pale red. When the animal changes to a pupa, the skin dries round it, and the whole assumes a completely oval form, and a reddish colour. In ten days after the fly emerges.

Muscle, in anatomy, a part of an animal body, destined to move some other part.

Muses, in the poetry of the ancients, personifications of the various branches of delightful exercise in which human genius displays itself. They were beautifully said to be the daughters of Jove and Mnemosyné, or Memory; and they were represented as companions of Apollo upon Parnassus. As the subject was wholly dependent upon the fancy of the poet, it was not always treated of alike. Thus according to some, all the functions of the muses were united in three persons; Mnemé, Aœde, and Meleté; that is, Memory, Song, and Meditation; but it was more usual to reckon nine, and to name them as follows: Clio, or Glory; Euterpé, or Sweetness; Thalia, or Jollity; Melpomené, or Interestingness; Terpsichore, or Mirth; Erato, or the Amorous; Polyhymnia, or the Maid of many Songs; Urania, or the Heavenly; and Calliopé, or the Sweet of Voice.

Musk, a dry, light and friable substance, of a dark blackish colour, tinged with purple; it is of a very strong scent, and only agreeable when in small quantity, or moderated by the mixture of some other perfume. It is produced by secretion, in an animal called "*moschus*," of the order of the "*pecora*."

Musket, a fire-arm, borne on the shoulder, and used in war. The length of a musket is fixed at three feet eight inches, from the muzzle to the pan, and it carries a ball of sixteen to the pound.

Muslin, a fine sort of cotton-cloth, which bears a downy knap on its surface. This knap, the French call *mousse*, as resembling moss; whence the name *muslin*. Muslins are made in the greatest perfection in Asia; but the nations of Europe imitate the manufacture with great success. The extreme lightness of the finer performances of the East is admirable. The turban of a prince is sometimes the product of the labour of twenty years of a man's life.

Mystics, in church history, persons who profess a peculiarly refined and sublime devotion; of which description are the Quietists.

Mythology, in polite literature, the researches after the theological and moral allegories of the antients and their explication.

N.

N, the thirteenth letter in the alphabet, and the tenth consonant: it is a liquid, the sound of which is formed by forcing the voice strongly through the mouth and nostrils, being, at the same time, intercepted by applying the tip of the tongue to the fore part of the palate with the lips open. It suffers no consonant immediately after it in the beginning of words and syllables, nor any before it except *g*, *k*, and *s*, as in *gnaw*, *know*, *snow*. As a numeral, N stands for 900, and with a dash over it N̄ for 900,000. N. or Nº stands for *numero*, i. e. in number; and N. B. for *nota bene*, observe well.

Nabob, a viceroy, or governor of a province in the mogul empire.

Nabonassar, *æra of*, a method of computing time from the commencement of Nabonassar's reign. The epocha of Nabonassar is of the greatest importance, as Ptolemy and other astronomers account their years from it.

Nadir, in astronomy, that point of the heavens which is exactly under our feet, and consequently diametrically opposite to the zenith.

Naias. See Nymph.

Nail, a horny excrescence growing at the ends of the fingers and toes of men and animals. The outward parts of nails have their respective names: the extremity is called the apex; the opposite end the root or base; and the white part near the latter, somewhat resembling a half moon, *lunula*. The substance of the nail is that of the skin, hardened, but firmly connected with it: for this reason, it is extremely sensible at its root, where the substance is yet tender; but at the apex, where it is perfectly hardened, it is capable of being cut without pain.

NAPTHA, in chemistry, one of the bitumens which has been much used in the experiments on the newly discovered metals POTASSIUM and SODIUM, which see.

NATRON, in chemistry, a term frequently given to soda, upon the supposition that it is the natron or nitrum of the ancients. Natural natron occurs either as an efflorescence on the surface of the soil or on decomposing rocks of particular kinds, or on the sides and bottoms of lakes that become dry during the summer. In Hungary the natron lakes are very numerous, and afford a vast quantity of it annually. About sixty miles north east of Grand Cairo, in Egypt, there is a lime stone valley, in which there are several extensive lakes, which become dry during the summer, and leave their sides and bottoms covered with a great quantity of soda or natron.

NATIONAL *Debt*, we have under the word DEBT given an account of the national Debt to the year 1807: we may now add that the whole debt, to the 5th of January 1810, was 811,898,088*l*. 12*s*. 8*d*.¾, which is more than eight times as much as the value of the gold and silver coined in England since the Restoration to the 25th of March, 1810; for during the reign of

Charles II. 7,524,105*l*. was coined.

James II.	2,737,637*l.*	was coined.
Anne	2,691,626*l.*	———
George I.	8,725,921*l.*	———
—— II.	11,966,576*l.*	———
—— III.	66,277,489*l.*	———

99,923,354*l.* Total gold and silver coined since the restoration.

NATURAL HISTORY, the description of the productions of nature. The natural history of a place is a topic of wide and various range. Mr. Boyle suggests, that it may be conveniently reduced to four heads: I. The things that regard the heavens: II. The air: III. The waters: and IV. The earth.

I. Of the first class are, 1. The longitudes and latitudes of places; 2. The length of the longest and shortest days and nights; 3. The climates and parallels; 4. The fixed stars seen there or otherwise.

II. Of the air should be observed, 1. Its temperature; 2. Its weight; 3. Its variations, the meteors most usual in it; 4. The winds most general; 5. The diseases said to depend upon its state; or in which it may be supposed to have a share; 6. Its usual salubrity; and 7. The sort of constitutions it does and does not agree with.

III. Of the waters, 1. The sea—its depth, tides, currents, saltness, and other qualities and peculiarities; 2. Rivers; 3. Lakes; 4. Mineral waters; 5. Fish and other productions.

IV. The things relating to the earth are last to be examined: these are, I. The earth itself; II. Its inhabitants; III. Its productions. In the earth itself, 1. its dimensions; 2. its situation; 3. its figure; 4. its surface, whether flat or otherwise;

5. the height, and other particulars of its mountains; 6. the soil; 7. its artificial improvements, if any. II. The inhabitants are then to be considered—1. their persons; 2. their diet, inclinations, and customs; 3. their constitutions; 4. their diseases. III. With respect to the external productions of the earth, 1. vegetables; 2. animals; 3. minerals, &c.

Natural history, in a more appropriate sense, treats of those substances of which the earth is composed, and of those organized bodies, whether vegetable or animal, which adorn its surface, soar into the air, or dwell in the bosom of the waters. In this restricted sense, natural history may be divided into two heads; the first teaches us the characteristics, or distinctive marks of each individual substance, whether animal, vegetable, or mineral: the second renders us acquainted with all its peculiarities, in respect to its habits, its qualities and its uses. To facilitate the attainment of the first, it is necessary to adopt some system of classification, in which the individuals, that correspond in particular points, may be arranged together. A knowledge of the second head can only be acquired by a diligent and accurate investigation of each particular object.

The study of natural history consists in the collection, arrangement and exhibition of the various productions of the earth. These are divided into three great kingdoms of nature, the boundaries of which meet in the ZOOPHYTES, which see. Minerals occupy the interior parts of the earth, in rude and shapeless masses. They are concrete bodies, destitute of life and sensation. See MINERALOGY.

Vegetables clothe its surface with verdure, imbibe nourishment through their roots, respire by means of leaves, and continue their kind by the dispersion of their seed. They are organized bodies, possessing life, but they are probably destitute of sensation. See Botany. Animals inhabit the exterior parts of the earth, respire, and generate eggs: are impelled to action by hunger, affection and pain; and by preying on other animals, and vegetables, restrain within proper limits and proportions the numbers of both. They possess organized bodies, enjoy life and sensation, and have the power of locomotion.

The Linnean system is divided into classes, orders, genera, species and varieties, to each of which their names, and characters are affixed. In this arrangement the classes and orders are arbitrary, the genera and species are natural. Of the three grand divisions of nature the animal kingdom stands highest in the scale, next to it the vegetable, and lastly the mineral kingdom. To the vegetable and mineral kingdoms we have already referred under the articles Botany and Mineralogy; with regard to the animal kingdom we may observe, that animals enjoy sensation by means of a living organization; animation by a medullary substance; perception by nerves, and motion by the exertion of the will. They are furnished with members for the different purposes of life; organs for their different senses and faculties; or powers for the application of their different perceptions. The following is an abstract of the Linnean arrangement of the animal kingdom.

CLASS I. *Mammalia.*

Orders.

Primates
Bruta
Feræ
Glires
Pecora
Belluæ
Cete

CLASS II. *Aves.*

Orders.

Accipetres
Picæ
Anseres
Grallæ
Gallinæ
Passeres.

Class III. *Amphibia.*

Orders.

Reptilia
Serpentes.

CLASS IV. *Pisces.*

Orders.

Apodes
Jugulares
Thoracici
Abdominales
Branchiostegi
Chondropterygii.

CLASS V. *Insecta.*

Orders.

Coleoptera
Hemiptera
Lepidoptera
Neuroptera
Hymenoptera
Diptera
Aptera.

CLASS VI. *Vermes.*

Orders.

Intestina
Mollusca
Testacea
Zoophyta.
Infusoria

NATURE, this word has various significations, as it is now used. It denotes 1. "The universe, or whole body of created things;" in which sense we say, the author of nature; the God of nature; nature is beautiful; there is no such thing in nature as a phœnix.

2. "The properties or qualities of things;" in which sense we say, such a man is noble by nature (meaning that his nobleness is an inherent

quality); the nature of fluids; by nature a stone falls to the earth; the established order of things (meaning that order which results from the properties or qualities of things); nature (in a living body) is strong or weak (meaning that the natural properties or qualities are exhausted or in vigour); nature left to herself will perform the cure (meaning that the natural properties or qualities will perform it); good nature; ill nature; it is the nature of a bird to fly; &c.

3. "The creative and superintending intelligence;" in which sense, we say nature, when we mean God; nature is benevolent and wise. Here by nature, we understand either the Deity himself, or a power performing the will of the Deity, and conducting every thing in this world under his order; a notion supported by some ancient systems of philosophy, adopted by poets, and most easy to popular idea. Independently of this, however, we often say Nature herself, &c. in a merely figurative sense; personifying the laws of nature, that is, the properties of matter. When, therefore, we say, that nature covers the earth with abundance, we mean that God covers the earth with abundance; when we say that nature is magnificent and inexhaustible, we mean that creation is magnificent and inexhaustible; when we say that it is the nature of sugar to be sweet, we mean that sweetness is a quality or property of sugar. When we speak of the study of nature, we mean the study of creation; which embraces first, the knowledge of things, and secondly, the knowledge of the properties of things.

When we speak of nature as opposed to what is artificial, we mean, according to the occasion, the original state of creation, or the original qualities of things; thus we say, the state of nature, alluding either to mountains, forests, &c. or to man; and a natural soil, in opposition to one that has been cultivated.

Nature, the whole body of created things, presents an assemblage of objects in every respect worthy of the attention of mankind. As an animal whom it behoves to make provision for his wants, the knowledge of its productions, and the means by which they may be best obtained, is of indisputable importance; these are points of view in which no persuasive to the study is necessary; necessity, and the rich rewards of assiduity, have ever stimulated him; and the shepherd and the husbandman have always been attentive to its phenomena: but the intellectual powers of man require other sources of enjoyment, and these, too, nature can supply. Here, curiosity can never want a motive; here, all the pleasures of tender feelings or sublime conceptions may be enjoyed. Assuredly the Deity designed that man should thus employ himself. Nature is made to conform in some degree to the hand of man, and resist only when his ignorance violates its essential order; it yields its secrets to his enquiries. To his sensibility it presents the most engaging images; and remains, to all ages, a picture perpetually renewed of the primitive creation of God. Were the whole human race depraved, and nothing but falsehood left in its society; on nature, the true character of the Deity would still remain impressed: there the innocent might still find enjoyment, the un-happy, consolation, and the despairing, hope. Its placid scenes calm the feelings, its grand ones exalt them; and neither of these states of mind are compatible with crime. Assuredly, nature proves not only that the motives for wickedness are absent from its haunts, but also by its salutary influence on the nerves, is designed to have a beneficial effect on the moral character of man. Another great consideration, in behalf of the study of nature (and this more peculiarly belongs to the study of the qualities of things) is the relief it affords from superstition.

Navigation, the art of conducting a ship from one place to another. It implies not only the mechanical management of the sails, and working the ship, which must be learned on ship-board, and in the practice of sailing, but likewise the theory, which is to be obtained from the following sources:

1. A table of the latitudes and longitudes of the most parts of the sea-coast, rocks, shoals, &c. in the frequented part of the world.

2. Maps and charts of the seas and lands, together with the depths of water, and the tides and the nature of the coast one may have occasion to approach.

3. The use and application of several instruments, necessary to point out the way the ship has to steer, to measure the rate she runs at, and to find the place she is in whenever necessary.

4. A sufficient stock of mathematical learning, particularly *trigonometry*, to enable a mariner to make a right use of the observations that may be deduced from the preceding elements.

NAUTILUS, in natural history, a simple shell, having no hinge, formed of one continued piece, rolled as it were into a spiral form, and having its cavity divided into a great number of cells, by transverse partitions, each of which has a perforation, and is continuous to the others by means of a pipe carried the whole length of the shell. The animal is famous for using its shell in the manner of a boat, and thus swimming on the surface of the sea; from which circumstance, it is introduced into the *Essay on Man* in these lines:

Who taught the little *nautilus* to sail,
Spread the thin oar, and catch the rising gale?

NAVY, the shipping of a prince or state. The ministerial management of the royal navy of Great Britain is intrusted to seven lords commissioners for executing the office of the lord high-admiral of England, commonly known by the title of lords of the admiralty. Commissioners of the navy, are officers whose department is wholly distinct from that of the admiralty. The number of those resident in London is eight, and there are others stationed in different parts of the empire. They superintend the dock-yards, and provide the vessels which the admiralty requires for service. To the royal navy there also belong a *victualling office*, an *office of sick and wounded seamen*, and a *pay-office*.

NEALING. See ANNEALING.

NEBULÆ, in astronomy, are certain spots in the heavens; some of which, by the discoveries of Dr. Herschel, are found to consist of clusters of telescopic stars, and others appear as mere luminous spots of different forms. The most considerable is one in the midway between the two stars on the blade of Orion's sword, marked θ by Bayer, discovered in the year 1656 by Huygens; it contains only seven stars, and the other part is a bright spot upon a dark ground, and appears like an opening into brighter regions beyond. Dr. Herschel has discovered likewise other phenomena in the heavens which he calls nebulous stars; that is, stars surrounded apparently with a faint luminous atmosphere of large extent. These the Doctor, by his large telescopes, has proved to be either mere clusters of stars, or such nebulous appearances as might be occasioned by a multitude of stars at a vast distance.

NECESSITY, *philosophical;* the advocates for this doctrine maintain that the volitions and actions of intelligent agents are produced by causes equally decisive and resistless as those which are admitted to actuate the material system. The doctrine of necessity extends to the mind what is obvious and uncontradicted with respect to matter. It insists on the absolute and uncontrollable influence of motives upon the human will and conduct. It asserts that the determinations and actions of every individual flow with unfailing precision and resistless operation, from the circumstances, motives, or states of mind with which they are preceded; and that in the whole series of his existence, no specific feeling, thought, or act could have been different from what it really was, these previous circumstances continuing the same. The grand arguments in defence of philosophical necessity are derived, 1. From the relation of cause and effect; 2. From the Divine Prescience; the foreknowledge of events must preclude their contingency, for a contingent event is an event which may or may not happen; but that which may not happen most evidently cannot be foreseen: 3. From the consciousness which every man feels of being influenced by some motive in the performance of every voluntary action. The advocates for this doctrine contend that it is the only theory consistent with moral discipline: that it tends to inspire that moral caution which is of the utmost importance towards the formation of habitual virtue, and that it tends strongly to excite and cherish the benevolent affections. It represents human agents as merely instrumental to the views and schemes of the Deity, under whose hands all intelligent creatures resemble the toys of a chequered table, directed to his purpose, and impelled by his energy. A consideration this admirably calculated to substitute compassion for resentment; to check the thirst of vengeance, and the severity of punishment. See Will, *Liberty of*. See also the question ably stated in Nicholson's British Encyclopedia, art. Necessity.

Necromancy, among the superstitions of mankind, a species of divination, performed by raising the dead, and extorting answers from them.

Nectar, among the poets, the drink of the gods, in contradistinction to their solid food, which was called ambrosia. The word is also used by some of the ancients to express honey.

Nectarium, see Botany.

Needle, a little instrument made of steel, pointed at one end, and pierced at the other, used in sewing, &c. Needles make a very considerable article in commerce, though there is scarcely any article cheaper, the consumption of them being immense. In the manufacture of needles, the first operation is to pass the steel through a coal fire, and under the hammer, to bring it out of its square figure into a cylindrical one. This done, it is repeatedly drawn through wire-drawing irons, till it is reduced to a fine wire. It is then cut into pieces of the length of the intended needles. These pieces are flattened at one end, in order to form the head and eye: they are then put into the fire to soften them farther, and thence taken out and pierced at each extreme of the flat part, on the anvil, by force of a puncheon of well-tempered steel, and laid on a leaden block to bring out, with another puncheon, the little piece of steel remaining in the eye. The corners are then filed off the square of the heads, and a little cavity filed on each side of the head: this done, the point is formed with a file, and the whole filed over: they are then laid to heat red hot on a long, flat, narrow iron, crooked at one end, in a charcoal fire, and when taken out of this, are thrown into a bason of cold water to harden. On this operation, much depends; too great heat burns them, and too little leaves them soft: the medium is learned by experience. When thus hardened, they are laid in an iron shovel on a fire, more or less brisk in proportion to the substance of the needles; taking care to remove them from time to time. This serves to temper them, and take off their brittleness. They are then straitened one after another with the hammer, the coldness of the water used in hardening having twisted the greatest part of them. The next process is the polishing. To perform this, ten or twelve thousand needles are ranged in little heaps against each other on a piece of new buckram, sprinkled with emery-dust. The needles thus disposed, emery-dust is thrown over them, which is again sprinkled with oil of olives; and lastly, the whole is made up into a roll, well bound at both ends. This roll is then laid on a polishing table, and over it a thick plank laden with stones, which two men work backward and forward a day and a half, or two days, successively: the roll is continually agitated by the weight and motion of the plank over it, and the needles within side being rubbed against each other with oil and emery are insensibly polished. After polishing, the dirt is washed from them with hot water and soap. They are then dried in hot bran, a little moistened, placed with the needles in a round box, suspended in the air by a cord, which is kept stirring till the bran and needles are dry. The needles, thus wiped in two or three different brans, are next put into wooden vessels, to have the good separated from those whose points, or eyes, have been broken either in polishing or wiping: the points are then turned all one way, and smoothed with an emery-stone, turned with a wheel. This operation finishes them, and there remains nothing but to make them into packets of two hundred and fifty each.

NEEDLE, *magnetical*, in navigation, a needle touched with a magnet, or loadstone, and sustained on a pivot in the center of the compass, where it assists the mariner by its general direction from pole to pole, or, as it is said in Europe, its pointing to the north. See MAGNETISM.

Negro, properly, an inhabitant of Nigritia in Africa; but the name is applied to all blacks with woolly hair. European merchants used to purchase these people from the coast of Africa, particularly that part called Guinea, and convey them to the islands and continent of America, where they were re-sold at an immense profit, to cultivate tobacco, sugar, indigo, &c. In Mexico, Peru, and the Brasils, they are used for digging mines.

Neptune, in mythology, the god of the sea, and father of fountains and rivers. He was the son of Saturn and Ops, and the brother of Jupiter and Pluto. He is said to have been worshipped in Egypt under the name of Cenobus, or Canopus, where his emblem was the figure of certain vases or pitchers with which the people filtrated the water of the sacred Nile, and from the mouth of which arose the head, and sometimes the head and hands of a man or woman. Among the Greeks, and Romans, the badge of this deity was a trident: among the Chinese he bears a load-stone.

Nereids, in mythology, sea-nymphs, daughters of Nereus and Doris, and celebrated for their beauty. In ancient monuments, the nereids are represented as riding upon sea-horses, sometimes with entire human forms, and at others, with the tails of fishes.

Nereis, in zoölogy, a genus of aquatic animals of which the *noctiluca*, or noctilucous (*night-shining*) nereis, a minute insect, is thus described by Gmelin: the head is roundish and flat; the two horns or feelers short and fibulated; the eyes prominent, and placed on each side of the head; the body composed of about twenty-three divisions or joints, smaller nearer the head than at the tail; and the whole animal, which is transparent, and of a water-green colour, is scarcely two lines in length. Each division, which goes round the whole body, ends in a short conical apex, out of which proceeds a little bundle of hairs; and from under these the feet grow in the form of flexile fibulated figments, destitute of any thing like claws. These are microscopic particulars; for the insect, as will be supposed from its minuteness, eludes the examination of the naked eye. This creature inhabits almost every sea, and is one of the causes of the luminousness of the ocean. It shines like a glow-worm, but with a brighter splendour, and is seen upon the surface of the water in such numbers, as, at night, to make the element appear on fire all around.

Nereus, in mythology, a marine deity, the son of Oceanus and Thetis. His residence was in the Ægean Sea, where he had the gift of prophecy, and the power of assuming any form.

Nest, a bed, or habitation where animals rear their young. The exquisite ingenuity which various creatures display in constructing their nests, has always been a subject of deserved admiration.

Nests, *Bird's*. See Birds.

Nestorians, a sect of Christians still said to be subsisting in some parts of the Levant, whose patriarch resides in Seleucia, their principal see is in Persia, and whose distinguishing tenet is, that Mary, though the mother of Jesus Christ, is not the mother of God.

Net, **Neat**, in commerce, that which is pure, and without adulteration or deduction. Hence we say a net rent, &c. a net produce is a term used to express any commodity, all *tare* and charges deducted.

NEUROPTERA: See ENTOMOLOGY.

NEUTER, in Latin grammar, a gender of nouns for names which are neither masculine nor feminine.

NEUTER *verbs*, by some grammarians called intransitive verbs, are those which govern nothing, and that are neither active nor passive. When the action expressed by the verb has no object to fall upon, but the verb alone supplies the whole idea of the action, the verb is said to be neuter; as, I sleep, we walk, they stand still.

NEUTRAL-*salts*, in chemistry, those compounded of an acid, and any other substance capable of uniting with it, and destroying its acidity. See SALTS.

NEUTRALIZATION, in chemistry, when substances mutually disguise each others properties, they are said to neutralize one another. This property is common to a great number of bodies; but it manifests itself most strongly, and was first observed in the acids and alkalies. Hence the salts obtained from the combination of these different bodies, received the name of neutral salts.

NEWS-PAPERS, periodical publications, daily, weekly, &c. for the purpose of communicating to the public every thing of importance, whether political, literary, &c. They were first published in England, August 22, 1642. The *Journal des Savans*, a French paper, was first published in 1665. One was published, under the title of the *Public Intelligencer*, in 1663, by Sir Robert L'Estrange, but dropped on the first appearance of the *London*

Gazette. Newspapers and pamphlets were prohibited by royal authority in 1680. Though at the Revolution, prohibitions of this kind were done away, and the press at liberty, yet newspapers were afterward made objects of taxation, and for this purpose were first stamped in 1713. The number of them, however, gradually increased, and there were printed in the whole kingdom, during the years

1775	12,680,000
1776	12,830,000
1777	13,150,642
1778	13,240,059
1779	14,106,842
1780	14,217,371
1781	14,397,620
1782	15,272,519

Their number at present is probably nearly double.

NEW-*Holland*, the largest island in the world, situated in the Indian Ocean, equal in size to the habitable part of Europe, first discovered in the beginning of the 17th century, and then called "Terra Australis Incognita." The original inhabitants are the most miserable people in the world, without houses, and without clothes; black, tall, thin, with small limbs, great heads and heavy brows.

NEW-STYLE, first used in England in 1753, was introduced to the western world by Pope Gregory XIII. The old-style, which is still used in Russia, is eleven days behind the reckoning of the new: that is, the 1st of March O. S. is the 11th N. S.

NICKEL, a white metal, which, when pure, is ductile and malleable. Its colour is intermediate between that of silver and tin, and is not altered by the air. It is nearly as hard as iron, and its specific gravity is eight or nine times greater than that of water. Nickel forms alloys with a number of metals.

Nictitating *membrane*, a very thin and fine skin, chiefly found in the bird and fish-kind, which covers the eyes of these creatures, sheltering them from dust, or from too much light, yet is so thin and pellucid, that they can see through it.

Night, that part of the diurnal period during which either hemisphere is turned away from the sun; the time of darkness. In scripture language, this word is sometimes used for the times of heathenish ignorance, as Rom. xiii. 12; for adversity and affliction, as Isaiah xxi. 12; and for death, as John ix. 4.

Nightingale, a species of motocilla, begins his song in the dusk of the evening and continues it all night. The nightingale is not known in Scotland, a circumstance which is attributed to the scarcity of hedges. The song of this bird charms every hearer. It is the constant theme of the eastern poets; and by these is represented as attached, in a most extraordinary degree, to the *rose*, their favourite flower. Thus, in a Persian fable, *literally* translated by Sir William Jones, we have the following passage:

"I know not what the *rose* says under his lips, that he brings back the helpless *nightingales*, with their mournful notes. One day, the gardener, according to his established custom, went to view the roses; he saw a plaintive nightingale, who was rubbing his head on the leaves of the roses, and was *tearing* asunder, with his sharp bill, that volume adorned with gold: The nightingale, if he sees the rose, becomes intoxicated; he lets go from his hands the reins of prudence."

NIGHTSHADE. See ATROPA.

NILOMETER, an instrument used to measure the height of the water in the river Nile, in its periodical overflowings. It is said to have been first used during the administration of Joseph.

NIOBE, in the poetry of the antients, the daughter of Tantalus, and wife of Amphion, king of Thebes. She had seven sons, and as many daughters. Presuming to prefer herself before Latona, and to slight the sacrifices offered by the Theban matrons to that goddess, Apollo and Diana, the children of Latona, resented the impiety. Apollo slew all her sons, and Diana all her daughters; upon which Niobe was struck dumb with grief, and remained without sensation. Cicero is of opinion, that on this account, the poets feigned her to be turned into stone. The antique statue of Niobe and her children is esteemed among the most exquisite productions of art.

NISI-PRIUS, a judicial writ, commanding the sheriff of any county to bring the jury impannelled at a certain day before the justices at Westminster, "nisi prius justiciarii domini regis ad assisas capi-" endas venerint;" that is "unless before that time, the justices come thither to hold assizes." By this clause, the inconveniences of travelling from all parts of the kingdom for trial are avoided; for the justices regularly visit the counties, and there try the causes so deferred, which are called nisi-prius actions.

NITRATES, in chemistry, salts formed of the nitric acid; and alkalies, earths, &c. The most important of these is NITRE, which see, below.

NITRE, or *salt-petre*, a simple salt, pellucid, but somewhat whitish. It is found immersed in imperceptible particles in earthy substances, as the particles of metals in their ores; but sometimes it is gathered native and pure, in the form of an efflorescence, or shapeless salt, either on its ore, or on old walls. The earth from which nitre is made, both in Persia and the East-Indies, is a kind of marl, found on the bare sides of hills exposed to the northern or eastern winds, and never in any other situation. The people of those countries collect large quantities of this earth, and having a large and deep pit, lined with a hard and tenacious kind of clay, they fill it half full of water, and into this they throw the earth; when this is broken and moulded to powder, they add more water, and mixing the whole together, suffer it to remain four or five days: after this, they open a hole made in one of the sides of the pit, which lets out all the clear water into a channel of about a foot wide, which is also lined with clay, and through which it runs into another very wide and shallow pit, which is prepared in a level ground, secured by slight walls on all but the north-east side, and open to the sun at the top: here the water evaporates by degrees; and the salt which it had imbibed from the earth crystallizes into small brownish-white, hexaedral, but usually imperfect crystals. This is the rough salt-petre brought from the East-Indies: there are some other methods of procuring it; but the far greater part of the nitre used in the world is prepared in this manner. Salt-petre is of great use in various manufactures: besides being the basis of gun-powder, it is employed in making white glass, and is of the same use as common salt in preserving meats. From the same substance, also, are prepared, Glauber's spirit of nitre or nitric and nitrous acid, &c.

Nitre is composed of Acid 44 parts.
Potash 52 —
Water 4 —
100

NITRIC *acid*, is a compound of oxygen and nitrogen or azote. The two principal constituent parts of our atmosphere, which, in certain proportions form the common air, do, in other proportions, yield one of the most powerful of all the acids. This consists of 70.5 of the oxygen and 29.5 of nitrogen. The nitric acid is of considerable importance in the arts. It is employed in etching copper; as a solvent of tin to form with that metal a mordant for some of the finest dyes: in medicine and various chemical processes. A compound made by mixing two parts of the nitric acid with one of the muriatic, is that which was formerly called the aqua regia, and is now known by the name of nitro-muriatic acid: it has the property of dissolving gold and platina. The nitric acid is obtained in the large way from nitre.

NIZAM, the title of great officers of state in the Asiatic governments.

NOBILITY, in civil institutions, rank conferred by express authority of the governing power. The origin of nobility is by some referred to the Goths, who rewarded their captains with titles of honour, In Britain, the term *nobility* is restrained to degrees of dignity above knighthood; in other countries, *nobility* and *gentility* are the same. British nobility is divided into five degrees, of baron, viscount, earl, marquis, and duke. These titles, which are hereditary, can only be conferred by the king's letters-patent.

It is a curious particular in the history of nobility, that among the natives of Otaheite, rank is not only hereditary, but actually descends to the son, to the degradation of the father, while yet alive: thus, he who is a nobleman to-day, if a son be born to him, is a commoner to-morrow, and his son takes his rank.—Nobility originated in the military tenure of lands.

Noble, an ancient coin of England, worth six shillings and eight-pence.

Noblesse, *nobility*. The nobility of France were exempt from taxes on their lands, a privilege which originated thus: in ancient times, the *thanes* held their lands in consideration of the performance of military service, and were therefore free from pecuniary levies, while the *ceorles*, who were not called upon to assist the state in this way, were subjected to imposts: in process of time, the *ceorles* were called into the field, without being freed from taxes; and the *thanes* ceased to perform military service, but continued to enjoy the privilege annexed. The *Venetian noblesse* were famous; it was in this body, that the sovereignty of the state resided. It was divided into three classes:—The first only comprehended twenty-four families; the second included the descendants of all those who were entered in the golden book, in the year 1289, and destined to govern the state, which then became an aristocracy; the third consisted of such as had bought the dignity of noble Venetian. The last class was only admitted to inferior employs; the two former to all indifferently. The title of noble Venetian was sometimes also given to foreign princes, &c.

NOCTURNAL *arch*, in astronomy, the arch of a circle described by the sun or a star in the night.

NOCTURLABIUM, or Nocturnal, an instrument chiefly used at sea, to take the altitude or depression of some stars about the pole, to find the hour of the night and the latitude of the place.

NODES, in astronomy, the two points in which the orbit of a planet intersects the ecliptic. These are called the ascending and descending nodes. The line in which the two circles intersect is called "the line of the nodes." This line, as it refers to all the planets, shifts its situation from east to west, contrary to the order of the signs.

NOLLE *prosequi*, in law, is a term made use of to signify that the plaintiff will proceed no farther in his action. In criminal cases it can only be entered by the attorney general.

NOMADES, a name given to nations whose whole occupation consists in feeding their flocks, and who have no fixed place of abode, but shift their residence according to the state of pasture.

NOMINATIVE, in grammar, the first case of nouns that are declinable. The nominative case is the subject of a proposition or affirmation: thus, in the words, the "*house* is repaired," *house* is the nominative of the noun; but in the words "repair the house," which contain no proposition or affirmat tion, *house* is made in the accusative case; and in the words, "I went to the *house*," where the person speaking is the subject, "I" is the nominative case. The nominative case stands before the verb; as "I went," and, "the *house* is repaired."

NONCONFORMISTS, those who refuse to join the established worship in the established church. Nonconformists in England, are of two sorts: 1. Such as absent themselves from divine worship in the established church, and attend the service of no other persuasion: 2. Papists and Protestant dissenters. The severity of some laws, still existing against Papists, is extreme; but they are not now put into execution. See DISSENTERS.

NON-JUROR, one who refused to take the oaths of fidelity to the succession, established at the revolution, and who was in consequence under certain incapacities, and liable to certain penalties.

NON-*Naturals*, in medicine, so called because by their abuse they became the causes of disease; air, meats and drinks, sleep and its opposite, motion and rest, the passions of the mind, and the retentions and excretions.

NON-*residence*, the wilful absence of an ecclesiastic from his benefice, continued for one month together, or for two months, at different times, in the year; for which he is liable to certain penalties: but bishops, the king's chaplains, &c. are excepted.

NON-*suit*, the dropping of a suit or action, or renouncing thereof by the plaintiff; a circumstance that generally happens on account of some error in the plaintiff's proceedings, when the cause is so far proceeded in that the jury is ready at the bar to deliver in their verdict. A nonsuit may take place in the following cases:—1. Where a plaintiff brings a personal action, and does not prosecute it with effect; 2. When upon trial he refuses to stand a verdict: 3. Where the plaintiff is not ready for trial at the calling and swearing of the jury.

Northern Lights. See *Aurora Borealis.*

Nose, the organ of smell. The use of the nose consists in its reception of impressions from the effluvial particles in nature, its serving in the great office of respiration, and its assistance in modulating the voice.

Nosology, a Greek word, signifying a discourse or treatise on diseases.

Nostoch, the name of a vegetable substance, which seems to differ from almost all others of the same kind. It is of a greenish colour, partly transparent, and of a very irregular figure. It trembles at the touch like jelly, but does not melt like that. It is found in almost all kinds of soils, sometimes on gravel walks after rain.

Notary, a person, usually a scrivener, who takes notes, or frames short drafts of contracts, obligations, charter-parties, or other writings. At present, he is called a notary-public, who publicly attests deeds or writings, in order to make them authentic in another nation; but he is principally employed in business concerning merchants, as making protests of bills of exchange, &c. Noting a bill, is the act of writing on its back the exact words or manner in which the payment of a bill which he presents is avoided.

Note, a character or abbreviation serving to express something in a little compass. Note in music, a character which marks a sound; that is, the elevation and falling of the voice, and the swiftness and slowness of its motions. In general, under the term note is comprehended all the signs or characters used in music, though in propriety, the word only implies the marks which denote the degrees of gravity and acuteness to be given to each sound.

Notonecta, the *boat fly*, a genus of insects belonging to the order of *hemiptera*, of which there are fourteen species, and seven of these common in Europe.—The following is the description of the *notonecta glauca*: its legs are long, and when taken out of the water it hops; it is very common in the ponds of water in Hyde-park, and in several places about London. It is of a very particular form, being flattish at the belly, and rising to a ridge in the middle of the back; so that when it swims, which it does almost always on its back, its body has much the resemblance of a boat in figure, whence its vulgar name. It is eight lines long, three broad, and two and a half thick. Nature has provided it with an offensive weapon resembling a sting. It must be cautiously handled by those who would avoid being pricked by it, for the point of its rostrum is exceedingly sharp and intolerable painful; but the sensation goes off in a few minutes. The head is large and hard; the eyes nearly of a triangular form; the nose, a long green hollow proboscis, ending in a hard and sharp point, which, in its natural posture, remains under the belly, and reaches to the middle pair of legs. The outer pair of its wings are of a pale flesh colour, with spots of a dead white; they are long, narrow, and somewhat transparent; they terminate in a roundish point, and perfectly cover the whole body. The triangular piece which stands between the top of the wings is hard, and perfectly black; the inner wings are broader and shorter than the outer ones; they are thin, perfectly transparent, and of a pale pearl colour. The hinder pair being longer than the rest, they serve as oars; and nature has tufted them with hair for that purpose. This creature mostly lives in the water, where it preys on small insects, killing them and sucking their juices with its proboscis, in the manner of the water scorpion, and many other aquatic insects: it seizes its prey violently, and darts with incredible swiftness to a considerable distance after it.

Though generally an inhabitant of the water, it sometimes, in good weather, crawls out, drying its wings, by expanding them in the sun, and takes flight: in this new situation it is not to be known for the same creature, unless by those who have accurately observed it.

Novel, in civil law, a term used for the constitutions of several emperors, as those of Justin, Tiberius, Leo, and more particularly of those of Justinian. The constitutions of Justinian were called novels, either from their producing a great alteration in the face of the ancient law, or because they were made on new cases, and, after the revisal of the ancient code, compiled by order of that emperor.

Novel, a composition which belongs to the class of poetry, in literature, as designing to please and instruct, and proceeding from the imagination, assisted by observation.

November, in chronology, the eleventh month of the Julian year, consisting only of thirty days; its name, November, originates in its being the ninth month of the Roman reckoning.

Novice, a person not yet skilled or experienced in an art or profession. Novice is more particularly used in monasteries for a religious person, yet in his or her year of probation, and who has not made the vows.

Noviciate, the term appointed for the trial of those who are to enter a monastery, in order to ascertain whether they feel the heavenly call, and have the qualifications necessary for living up to the rule to which they are to bind themselves by vow.

Noun, in grammar, a word that denotes any object of which we speak, whether that object be animate, inanimate or ideal; as *man*, *gate*, *mind*. Nouns or names, as they should be called, form the basis of all language: thus, we call a certain instrument, a *saw*; the act of using that instrument, *sawing*; and thence obtain the verb, to *saw*.

Nucleus, in general, denotes the kernel of a nut, or any seed inclosed within a husk. The term *nucleus* is also used for the body of a comet, otherwise called its *head*.

Numbers, in poetry, oratory, &c., certain measures, proportions, or cadences, which render a verse or period agreeable to the ear.

Numbers, *poetical*, consist in a certain harmony in the order, quantities, &c. of the feet and syllables, which make the piece musical to the ear, and fit for singing, for which all verses were originally intended.

"NUMBERS, *Rhetorical, or Prosaic,* are a sort of simple unaffected harmony, less glaring than that of verse, but such as is perceived, and affects the mind with pleasure. The substance of the remarks of critics on this subject has been reduced to the following heads:

1. The style becomes numerous by the alternate disposition and temperature of long and short syllables, so as that neither the multitude of short ones render it too hasty, nor that of long ones too slow and languid. Sometimes, however, long and short syllables are thrown designedly together, without any such mixture, to excite in the mind the idea of slowness, or celerity, of motion.

2. The style becomes numerous by the intermixture of words of one, two, or more syllables; whereas the too frequent repetition of monosyllables renders it pitiful and grating.

3. It contributes greatly to the numerousness of a period, to have it closed by magnificent and well-sounding words.

4. The numbers depend not only upon the grandeur of the words in the close, but of those in the whole tenor of the period.

5. To have the period flow equally and easily, the harsh concurrences of letters and words is to be studiously avoided, particularly the frequent meeting of rough consonants; the beginning the first syllable of a word with the last of the preceding; the frequent repetition, where repetition is not desirable, of the same letter or syllable; and the frequent use of words ending with the same sound.

6. The utmost care is to be taken lest, in aiming

at oratorical numbers, the writer fall into poetic ones, and, instead of prose, produce verse.

NUMBERS, a book of the bible, so called because it contains an account of the numbering of the people. The book comprehends a period of the Israelitish history of about thirty eight years.

NUMERAL LETTERS, those which are occasionally used to express numbers. See ARITHMETIC.

NUNCUPATIVE *will*, a will or desire expressed verbally, but not put into writing. Nuncupative, in a general sense, signifies something that exists only in name.

NUTMEG, the fruit of a species of *Myristica*: it grows principally, but not exclusively, in the Banda Islands, and the trade was formerly monopolized by the Dutch. It is generally separated from its outward coat, the mace, before it is shipped; but the whole fruit is occasionally imported in a preserved state, as a sweetmeat.

NYCTALOPIA, a disorder of the eye, in which, through weakness it can discern objects only by night, or in obscure places. This is a constitutional defect, not to be cured. Anatomists attribute it to the want of a constituent part of the animal substance, called the *rete mucosum*, which gives colour to the complexion, hair, and eyes.

NYCTHEMERON, the day and night, or space of twenty-four hours.

NYMPH, in mythology, an inferior goddess, inhabiting the mountains, woods, waters, &c. The nymphs, who were represented as existing without number, were the daughters of Oceanus and Tethys.

"They were supposed," says Chandler, "to enjoy longevity, but not to be immortal. They were believed to delight in springs and fountains. They are described as sleepless, and as dreaded by the country people." "Their dwellings had generally a spring or well of water; the former often a collection of moisture condensed or exuding from the roof and sides; and this, in many instances, being pregnant with stony particles, concreted, and marked its passage by incrustation, the groundwork, in all ages and countries, of idle tales framed or adopted by superstitious and credulous people."

NYMPH, a name for a CHRYSALIS, which see.

O

O, the fourteenth letter in the alphabet, which has different pronunciations: the sound is often so soft as to require it double, and that chiefly in the middle of words, as *goose*, *reproof*, &c. in some words this *o o* is pronounced like the short *u*, as in *flood*, *blood*. O, as a numeral, is sometimes used for eleven, and with a dash over it for eleven thousand.

OAK, the name of a tree ranking among the largest and most magnificent, and called in botany *quercus*. The species of oak are extremely numerous, and dispersed over almost all parts of the world. An oak of the evergreen kind, peculiar to St. Thomas, in Devonshire, is mentioned in the *Gentleman's Magazine* for 1773. It is in that neighbourhood called *Lucombe* oak, from one William Lucombe, who cultivated it near Exeter with success. It grows as upright as a fir, and its wood is hard like that of the common oak. Its growth is so quick that, in twenty or thirty years, its girth and altitude exceeds that of a common one at one hundred years of age. It is cultivated in Cornwall, Somersetshire, and various other places. The growth of the common oak in general is extremely slow. The acorn, or *oak-corn*, is the fruit of this tree.

Oak-bark and saw-dust are used in tanning. In medicine, the bark is a strong astringent, and is therefore recommended in hemorrhages. Some persons have supposed that it would answer every purpose of Peruvian bark; but this idea, others, after trial, have discountenanced. Both the bark and the leaves are employed in hot-beds; and the leaves are now reckoned better for this use than the bark.

OAK-*leaf galls*, protuberances on the leaves of the oak formed and inhabited by insects. They appear in April and remain till June or longer. When opened, they are found to contain one insect only. "It might appear that the parent fly, when she had formed a gall for the habitation of her worm offspring, had placed it in an impregnable fortress: but this is not the case; for it frequently happens that a fly which produces a worm of the carnivorous kind, pierces the sides of the gall, and deposits her egg within it. The worm, when hatched, feeds upon the proper inhabitant; and, finally, after devouring it, passes itself into the chrysalis state, and thence appears in the form of its parent-fly, and is seen making its way out of the gall."

OAKUM, old ropes untwisted, and pulled out into loose hemp, in order to be used in caulking seams of a ship, for stopping or preventing leaks.

Oat, a species of corn, known in botany under the name *avena*. The original country of the oat; that is, the place in which it grows without cultivation, is fixed by Mr. Bruce, in Aroossi, a small territory near the source of the Nile: "Wild oats," says this gentleman, "grow up here spontaneously, to a prodigious height and size, capable often of concealing both the horse and his rider; and some of the stalks being little less than an inch in circumference. They have, when ripe, the appearance of small canes. The inhabitants make no sort of use of this grain in any period of its growth. The uppermost thin husk of it is beautifully variegated with a changeable purple colour: the taste is perfectly good."

Oath, a formal and solemn pledge, by word of mouth, made in the presence of a magistrate, or other person rendered competent by the law to administer it. Oaths are taken on two very different occasions: In the first, an oath is an assertion of the truth of something which the juror, or swearer, says has happened; in the second it is a promise or vow respecting his future conduct. If the thing asserted is not true, we say that the juror has sworn falsely, and is guilty of perjury. If he that swears to pursue a certain line of conduct fails to do so, we say that he has broke his oath; but we cannot charge him with perjury. In both these cases, however, the general form of an oath is the same: the juror consents to expect the blessings of God, only as he does or shall speak the truth, or do the thing required of him. "The juror, if a Christian, while he hears or repeats the words of the oath, puts his right hand upon a Bible or other book containing the four gospels. The meaning of this part of the ceremony, is very much obscured by an omission: as is, indeed, that of the whole, by the very careless manner in which it is frequently performed. The words generally used are these: *So help me God!* but it was designed that, with reference to the gospels, it should also be said, *and the contents of this book.*

In jurisprudence, an oath answers a two-fold purpose: it is intended to lay hold of the consciences of men, by the solemnity of the act, and by connecting their words with their religious hopes; and, in a legal point of view, by its formality to render an assertion capable of proof, and at once facilitate the punishment of perjury, and put men upon their guard against the commission of the crime.

Oath, *Coronation*, an oath of the promissory kind, taken by the sovereigns of Great Britain, at their coronation. The words are these:

"The archbishop or bishop shall say—Will you solemnly promise and swear to govern the people of this kingdom of England, and the dominions thereunto belonging, according to the statutes of parliament agreed on, and the laws and customs of the same?"

"The king and queen shall say,—I solemnly promise so to do."

"Archbishop or bishop:—Will you, to the utmost of your power, cause law and justice, in mercy, to be executed in all your judgments?"

"King or queen:—I will."

"Archbishop or bishop:—Will you to the utmost of your power maintain the laws of God, the true profession of the gospel, and the Protestant reformed religion established by law? and will you preserve unto the bishops and clergy of this realm, and to the churches committed to their charge, all such rights and privileges as by law do or shall pertain unto them or any of them?"

"King or queen:—All this I promise to do."

"After this, the king or queen, laying his or her hand upon the holy gospels, shall say,—The things which I have here before promised, I will perform and keep: So help me God!—and then shall kiss the book."

Object-*glass*, in a microscope or telescope, the glass placed at the end of the tube which is next the object.

Objective *case*, in some grammars, the accusative case. The objective, or accusative case, is that in which the noun is the object to which the action refers; as *I reminded the master*, in which words, the *master* is used in the accusative case.

Oblate, flattened or shortened, as an oblate spheroid, having its axis shorter than its middle diameter, being formed by the rotation of an ellipse about the shorter axis. The oblateness of the earth refers to the diminution of the polar axis, in respect to the equatorial.

Oblique *cases*, in grammar, all except the nominative.

Observatory, a place convenient for taking observations of the heavenly bodies. An Observatory is generally a building in a lofty, or at least unconfined situation, and supplied with the requisite instruments. The most celebrated edifices of this kind, are those of Greenwich, Paris, Uraniburg, built by Tycho Brahe, Pekin, and Benares.

The following instruments are necessary in an observatory. 1. A pendulum clock for showing equal time. 2. An achromatic refracting telescope, or a reflecting one of two feet in length. 3. A micrometer. 4. A quadrant. 5. An astronomical or equatorial sector. And 6. A transit and equal altitude instrument. The equatorial or portable observatory is an instrument designed to answer a number of useful purposes in practical astronomy, independent of any particular observatory.

Obi, a sort of talisman, to which some of the nations of Africa pay a superstitious reverence.

Occult, something hidden, secret or invisible. The occult sciences, so called as depending upon invisible things, are magic, necromancy, &c. Occult qualities, in philosophy, were those qualities of body or spirit, which baffled investigation. Experimental philosophy sets its face against *occult causes* or *qualities*, as terms in which ignorance takes shelter, and from which error is produced.

Occultation, in astronomy, the time during which a star is hid from our sight, by the interposition of the body of the moon, or some other planet.

Ocean, that mass of salt water which surrounds all parts of the world, and which is distinguished, for convenience of description, as if divided into three principal sections. 1. The Atlantic ocean, which divides Europe and Africa from America, and is, in general, about 3000 miles in width; 2. The Pacific ocean, or South Sea, which divides

America from Asia, and is generally, about 10,000 miles over; 3. The Indian ocean, which separates the East-Indies from Africa, and is 3000 miles across. The Mediterranean, Baltic, White-Sea, &c. are parts or branches of the *one* ocean.

OCHRE, in natural history, a genus of earths, slightly coherent, composed of fine, smooth, soft, argillaceous particles, rough to the touch, and readily diffusible in water. Ochres are of various colours, as red, blue, yellow, brown, &c.

OCTAGON, a figure of eight sides and angles. When all the sides and angles are equal, it is called a "*regular octagon.*"

OCTAHEDRON, a body consisting of eight equal and equivalent triangles.

OCTOBER, the eighth month of the year as arranged by Romulus, and thence named; but the tenth in the kalender of Numa, Julius Cæsar, &c.

ODIN, *Woden* or *Wodan*, the supreme deity of the ancient nations of northern Europe, from whom the fourth day of the Christian week is called Wednesday, or Woden's day. See DAY. "Odin," says Dr. Henry, in his History of Great Britain, "is believed to have been the name of the one true God among the first colonies who came from the east, and peopled Germany and Scandinavia, and among their posterity for several ages: but at length a mighty conqueror, the leader of a new army of adventurers from the east, over-run the north of Europe, erected a great empire, assumed the name of *Odin*, and claimed the honours which had been formerly paid to that Deity. From thenceforward, this deified mortal, under the name of *Odin*, or *Wodin*, became the chief object of the idolatrous worship of the Saxons and Danes in this island, as well as of many other nations. Having been a mighty and successful warrior, he was believed to be the god of war, who gave victory, and revived courage in the conflict. Having civilized, in some measure, the countries which he conquered, and introduced arts formerly unknown, he was also worshipped as the god of arts and artists. In a word, to this Odin his deluded worshippers impiously ascribed all the attributes which belong only to the true God: to him they built magnificent temples, offered many sacrifices, and consecrated the fourth day of the week, which is still called by his name in England, and in all the other countries where he was formerly worshipped."

Oesophagus, the gullet, is a membranaceous canal, reaching from the fauces to the stomach, and conveying into it the food taken at the mouth. Its figure is somewhat like a funnel, and its upper part is called the pharynx.

Oestrus, in natural history, the gad-fly, a genus of insects of the order diptera. The species of this genus are extremely troublesome to horses, sheep, and cattle. There are twelve species named Oestrus bovis, Oestrus equi, Oestrus hominis, &c. The principal European species is Oestrus bovis, or the ox-gad-fly, which is of the size of a common bee. The female of this species, when ready to deposit her eggs, fastens on the back of a heifer, or a cow, and piercing the skin with the tube situated at the lip of the abdomen, deposits an egg in the puncture, and then proceeds to another spot at some distance from the former, repeating the same operation at intervals, on many parts of the animal's back. The pain which the operation occasions is extreme, and hence cattle, as if forseeing their cruel enemy, are observed to be seized with the most violent horror when apprehensive of the approaches of the female oestrus, flying instantly to the nearest pond or pool of water, it having been observed that this insect rarely attacks cattle when standing in water.

Office, *Holy*. See **Inquisition**.

Offices *and Pensions, duty upon*, a branch of the king's extraordinary perpetual revenue, consisting in a payment of 1s. in the pound, over and above all other duties, out of all salaries, fees, and perquisites, of offices and pensions payable by the crown. This tax took place in the thirty-first year of George II.

Officer, a person possessed of a post or office. The great officers of the crown, or of state, are the lord high-steward, the lord high-chancellor, the lord high-treasurer, the lord president of the council, the lord privy-seal, the lord-chamberlain, the lord high constable, and the earl-marshal.

Non-commissioned officers, are serjeant-majors, quarter-master serjeants, serjeants, corporals, and drum and fife majors, who are nominated by their respective captains, and appointed by the commanding officers of the regiments, and by them reduced without a court martial.

Officers, *general*, those whose command is not limited to a single company, troop or regiment; but extends to a body of forces, composed of several regiments.

Offing, in sea-language, is a distance from the shore sufficient to afford deep water, and to need no assistance from a pilot for the conduct of a ship:

thus if a ship be seen from shore sailing out to leeward, they say, *she stands for the offin;* and if a ship, having the shore near her, have another farther out to sea than herself, they say of that ship, that she is *in the offin.*

OIL, an unctuous inflammable substance, drawn from various substances, both animal and vegetable. From the peculiar properties of different oils, they are naturally divided into two kinds, the fixed or fat oils, and the volatile or essential oils: the former require a high temperature to rise them to a state of vapour, but the volatile oils are volatilized at a temperature of boiling water, and even at a lower one. Both the volatile and fixed oils are obtained from plants, and sometimes from the same plant, but always from different parts of it. While the seeds yield the *fixed* oil, the *volatile* is extracted from the bark or wood. Olive oil has been decomposed and found to contain about

79 parts of Carbon and
21 ——— Hydrogen.

OLIGARCHY, a government where the administration of affairs is confined to a few hands.

OLYMPIAD, the space of four years, by which the Greeks reckoned time.

OLYMPIC *games*, were solemn games celebrated by the Greeks, and so called from the Olympian Jupiter, or Jupiter worshipped at Olympia, to whom they were dedicated.

OLYMPUS, a name given by the Greeks to several mountains, the highest of which stands on the north of Thessaly, on the confines of Macedonia, and is famous for the fable of the Titans. This mountain was reckoned the most lofty in the whole world, exceeding the flight of birds: for which reason it was called *heaven*, than which nothing is higher. The serenity reigning on its summit is celebrated by the poets.

OMEN, in the history of superstition, an accident supposed to forerun misfortune. Among the antients, there were internal omens, or those which affected the persons themselves. Of this sort, were consternations, or *panic fears*, that seized upon men without any visible cause, and were therefore imputed to the demons, and especially to *Pan*. Of internal omens, or presentiments, there are not wanting persons, of weak spirits, who still talk with seriousness; and almost every object, animate or inanimate, together with every circumstance that occurs, is, with this or that believer, ominous.

OPIUM, the juice of the white poppy, with which whole fields are sown in Asia-Minor, and which is said to be produced in its greatest strength in the soil about the Ganges.

OPTICS, the science of the laws by which the rays of light part from a luminous point, and reach the eye; that is, the knowledge of the causes of vision, and of the effects of light, direct, reflected, or refracted. In this comprehensive sense, Newton called his book of light and colours, *optics*. In a simpler application, optics is the science of direct vision only; while the science of the laws and properties of the rays of light, when considered as reflected, are called *catoptrics*, and the science of refracted rays, *dioptrics*; so that, in its general sense, optics comprehends the *whole*, of that of which catoptrics and dioptrics are two *parts*. Under the article LIGHT we have given an account of some of its properties: observing, among other things, that the particles of light must be inconceivably small, for they cross each other in all possible directions without the least disturbance. Take a piece of brown paper and make a pin-hole in it, through this small aperture, a great variety of objects may be seen, as trees, houses, &c. The light proceeding from all these objects, must pass at the same instant through the hole, and cross each other before they reach the eye, yet the clearness of vision is not disturbed by it.

The particles flowing from a luminous body, as the sun, or a candle, and falling upon our eyes, give us the idea of light: and the rays of light falling on bodies, and reflected to our eyes, give us the idea of those bodies. For if you go into a dark room you have not the smallest conception of the several articles of furniture that it contains: admit the rays of light, these, at the same instant, (owing to the great swiftness with which they travel), fall upon the bodies in the room and are reflected to the eyes, thereby exciting in our minds the idea of these bodies.

Every point of a visible body reflects the rays of light in all manner of directions: hence every part of the surface of a body which is towards a spectator will be visible to him, when no intervening object stops the passage of light.

A parcel of rays of light proceeding from a point is called a *pencil of rays*.

A medium is any transparent body which suffers the rays of light to pass through it. Thus water, air, and glass are *media*.

Parallel rays are such as move always at the same distance from each other.

If rays continually recede from each other, as from C to *c d*, they are said to *diverge*. Plate Optics, Fig. 1.

If they continually approach each other, as in moving from *c d* to C, they are said to *converge*.

The point at which converging rays meet is called the *focus*.

The point towards which they tend, but which they are prevented from reaching by some obstacle, is called the *imaginary focus*.

While the rays of light continue in any medium of an uniform density, they are straight.

If rays of light, pass from one medium to another in a *perpendicular* direction, they proceed through this medium in the same direction as before. Thus, if F C, fig. 2, be a ray of light passing from air into water, it will continue on to K. But when rays of light pass *obliquely* out of one medium into another, which is either more dense, or more rare, they are bent out of their former course, and are then said to be *refracted*.

Rays of light are always refracted *towards* a perpendicular in a *denser* medium, and this refraction is more or less, in proportion as the rays of light fall more or less obliquely on the refracting surface. Let B C be supposed to be a ray of light passing out of air into water or glass L G, at the point C; F C is a line drawn perpendicular to L G, and the ray B C instead of proceeding along C H, will be bent towards the perpendicular C, as along C I.

When light passes out of a denser into a *rarer* medium, it moves in a direction *farther* from the perpendicular. Thus if the ray C I pass out of glass into air, it will not proceed in C *x*, but in the direction C B, farther from F C than C *x*.

Take a pan A B D C (fig. 3,) with an upright side into a dark room; let in, by means of a small hole in the window-shutter, a ray of light C B, so as to fall upon the bottom of the pan at E; mark the spot E; then, without moving the pan, fill it with water, and the ray will now not pass on to E, but will be refracted to F. The candle G will answer as well as the direct rays of the sun.

If a shilling be stuck on the part F with wax, so that an eye at G cannot see it when the pan is empty, it will become visible the moment the vessel is filled with water.

Take a glass goblet half full of water and put a shilling into it, then put a saucer or plate upon it, and holding it tight on, turn plate and glass together: a byestander unacquainted with the laws of refraction, will suppose that he sees a shilling and a half crown; the one is seen by refraction through the water, the other by the rays after refraction at the surface.

A *lens* is a glass ground into such a form as to collect or disperse the rays of light which pass through it. There are various kinds of lenses, named according to their forms. A plano-convex lens has one side flat, and the other convex, as A, fig. 4. A "plano concave" is flat on one side, and convex on the other, as B. A "double convex" is convex on both sides as C. A "double concave" is concave on both sides, as D. A "meniscus" is convex on one side and concave on the other, as E. The *axis* of a lens is a line passing through the centre; thus F G is the axis to all the five lenses. If parallel rays fall upon a plano-convex lens, they will be so refracted as to unite in a point behind, called the principal focus, or focus of parallel rays. Thus the rays *a*, *b* (fig. 1) falling upon *c d*, are refracted towards the perpendicular C *x*, and unite in C.

The distance from the middle of the glass to the focus, is called the *focal distance*. The focal distance of a plano convex lens, is equal to the diameter of the sphere of which the lens is a portion.

The focal distance of a double convex lens is equal to the radius of a sphere of which the lens is a portion. See fig. 5.

All the rays of the sun which pass through a convex glass, are collected in its focus. The force of the heat at the focus is to the common heat of the sun, as the area of the glass is to the area of the focus. If a lens four inches in diameter collect the sun's rays into a focus at the distance of 12 inches, the image will not be more than one tenth of an inch in diameter, the surface of this little circle is 1600 times less than the surface of the lens, and consequently the heat will be 1600 times greater at the focus than at the lens. Hence the construction of common burning glasses, which are all double convex lenses. We see the reason why furniture has been set on fire by leaving a globular decanter of water incautiously exposed to the rays of the sun; which acts as a double convex lens.

If another double convex F G fig. 5, be placed in the rays at the same distance from the focus, it will so refract the rays, that they shall go out of it parallel to one another. It is evident that all the rays except the middle one, cross each other in the focus *f*, of course the ray D A, which is uppermost in going in, is the lowest in going out, as G *e*. If a candle be placed at *f*, the diverging rays between F G, will, upon going out of the lens, become parallel at *d c*. If the candle be placed nearer the glass than the focus, the rays will *diverge* after going through the lens. If the candle be placed farther from the glass than the focus, the rays will *converge*, after passing through the glass, and meet in a point, which will be more or less distant from the glass, as the candle is nearer to, or farther from its focus. Where the rays meet they will form an inverted image of the flame of the candle.

If an object A, B, C, (fig. 6) be placed beyond the focus F of the convex glass *d e f*, some of the rays which flow from every point of the object on the side next the glass, will fall upon it, and after passing through it they will be converged into as many points on the opposite side of the glass, where the image of the whole will be formed, which will be inverted. Thus the rays, flowing from A, as A *d*, A *e*, A *f*, will converge in the space *d a f*, and by meeting in *a* will there form the image of the point A: and so of those rays flowing from B and C, and of course of all the intermediate parts.

The picture will be as much larger or less than the object, as its distance from the glass is greater or less than the distance of the object.

When parallel rays pass through a double concave lens they will diverge after passing through the glass, as if they had come from a point in the centre of the concavity of the glass. This point is called the *imaginary focus*. If the rays *a*, *b*, *c*, &c. (fig. 7) pass through A B, and C be the centre of concavity; then the ray *a*, after passing through the glass, will go on in the direction *k l*, as if it had come from C and no glass in the way; the ray *b* will go on in the direction *m n*, and so on.

When rays of light strike against a surface, and are sent back from it, they are said to be *reflected*. The ray that comes from any luminous body, and falls upon a reflecting surface, is called the *incident ray*. If L G, (fig. 2) be a reflecting surface, as a looking glass, then B C is the incident ray, and C E is the *reflected* ray.

The "angle of incidence" is that which is contained between the incident ray, and a perpendicular to the reflecting surface in the point of reflection. The "angle of reflection" is that contained between the perpendicular and the reflected ray.

The "angle of refraction" is that contained between the refracted ray and the perpendicular. In fig. 2 B C being the incident ray, B C F is the angle of incidence, F C E is the angle of reflection, and I C K is the angle of refraction.

A *mirror* or *speculum* is an opaque body whose surface is finely polished, so that it will reflect the rays of light which fall upon it, and thus represent the images of objects. Mirrors are made of metal or glass, polished on one side and silvered on the other. There are three kinds of mirrors, viz. the *plane*, the *convex*, and the *concave*. Common looking-glasses are called plane-mirrors; but the concave and convex are denominated mirrors. When a ray of light is reflected from any surface, the angle of reflection is equal to the angle of incidence. Thus the angle B C F, (fig. 2) is equal to F C E. The same is true of convex and concave mirrors.

When parallel rays fall upon a concave mirror, they will be reflected, and meet in a point, at half the distance of the surface of the mirror from the centre of its concavity. If I stand before a large concave mirror, beyond its centre of concavity, I shall see an inverted image of myself in the air. And if I hold out my hand towards the mirror, the hand of the image will come out and coincide with it, as if the two were shaking hands. If I reach my hand farther, the hand of the image will pass by it, and if I move my hand to one side, the hand of the image will move to the other. A by-stander will see nothing of the image, because none of the reflected rays can enter his eyes.

The eye is of a globular form, and is composed of three *coats*, covering one another, and inclosing different substances called *humours*. The three coats are the "sclerotica," the "choroides," and the "retina." The three humours are the "aqueous," the "crystalline," and the "vitreous."

A B G, fig. 8, represents a section of the globe of the eye, the three circles represent the three coats; the outer one is the *sclerotica*, but the part A E F B is called the *cornea*. The middle circle is the choroides, the fore part of which is called the *iris*, and the inner circle represents the *retina*, which serves to receive the images or objects produced by the refraction of the different humours of the eye. The aqueous humour fills up all the space A, E, F, B, *x*; *y x*, is the crystalline in the form of a double convex lens; and the vitreous humour occupies all the interior part of the eye *m n* behind the crystalline. From the hinder part of the eye proceeds the optic nerve *d*, which conveys to the brain the sensations produced on the retina.

Objects are seen by means of their images being painted on the retina of the eye. As the object A B C, sends out rays that fall on the *cornea* of the eye between E, and F, and by passing on through the pupil and humours, they will be converged to as many points on the *retina*, and will there form a distinct inverted picture *c b a*, of the object. Thus the pencil of rays *q r s*, that flow from A will be converged to the point *a* on the retina; those from B, will be converged to the point *b*; those from C to point *c*; and so of all the intermediate points; by which means the whole picture *a b c* is formed and the object is made visible. Though the images of objects are painted on the retina in an inverted state, yet they are seen erect.

Dimness of sight generally attends old people, which may arise either (1) by the eyes growing too round or too flat, and not uniting the rays at the retina: or (2) by the humours losing their transparency in some degree, which makes every object appear faint and indistinct. Spectacles are intended to assist the sight of those whose eyes are either too round or too flat. *Concave* glasses are necessary to those whose eyes are too round. *Convex* glasses are necessary to those whose eyes are too *flat*. Eyes that have their humours of a due convexity cannot see an object distinctly at a less distance than about seven inches.

Microscopes are instruments for viewing small objects. They apparently magnify objects because they enable us to see them nearer, without affecting the distinctness of vision. Take a piece of brown paper and make a pin hole in it, then bring the eye close to the hole, and the paper within two or three inches of a small print, which will be apparently much magnified, though without the paper the letters would at that distance be wholly illegible.

There are three kinds of microscope, the *single*, the *compound* and the *solar*. The single microscope, is only a small double convex lens, having the object placed in the focus, and the eye at the same distance on the other side. The magnifying power of the single microscope is found by dividing seven inches, the least distance at which an object can be seen distinctly by the naked eye, by the focal distance of the lens. By the experiment just mentioned the brown paper was brought twice or three times nearer the book than the distance of distinct vision, and the length of the letters were magnified two or three times. With a lens whose focal distance is only one inch, the length of an object would appear to be seven times larger than it is, and the surface would be magnified 49 times, that is the square of 7. If the focal distance of the lens be only the ¼ of an inch, then the diameter of an object will be magnified 28 times (because 7 divided by ¼ is the same as multiplying 7 by 4) and the surface will be magnified 784 times.

The compound microscope consists of an object-glass and an eye-glass. The object to be viewed is *a b*, (fig. 9,) *c d*, is the object-glass, and *e f*, the eye-glass. The object is placed a little beyond the focus of *d c*, the rays will converge and the image be formed at *g h*. The image, therefore, and not the object, is viewed by the eye D E, through the lens *e f*, which is so placed that the image *g h* may be in its focus, and the eye about the same distance on the other side; the rays of each pencil will be parallel after going out of the eye-glass as at *e* and *f*, till they come to the eye at *k*, where they will begin to converge by the refractive humour of the eye, and having crossed each other and passed through the crystalline and vitreous humours, they will form the inverted image A B on the retina. There are generally two eye glasses, by which means the object is less magnified, but more of it is seen.

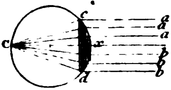
The solar microscope depends on the sunshine, and is used in a darkened room. It is composed of a tube, a looking glass, a convex lens, and a single microscope. The sun's rays are reflected by the *looking-glass* through the tube upon the object, the image of which is thrown upon a white screen, sheet, &c. placed at a distance to receive it. The magnifying power of the instrument is in proportion as the distance of the image from the object glass is greater than the object itself is from it. Thus if the distance of the object from the object glass be ¼ of an inch, and the distance of the picture be 10 feet or 120 inches, then the object is magnified in length 480 times.

The *magic lantern*, is an instrument used to magnify paintings on glass, and throwing their images upon a white screen in a darkened chamber. Thus Fig. 10, represents the machine with the effect it produces. The lantern contains a reflector which is so situated as to have the light of a candle in its focus. On the fore part of the lantern there is a thick double convex lens, or a plano-convex (usually called a bull's eye) of short focus. The lantern is closed on every side, so that no light can come out of it, but what passes through the lens. In the direction of this lens there is a tube *t* fixed to the lantern, which has a lateral aperture from side to side; through this the glass slider *a a* with the painted small images, is moved in an inverted position. The forepart of the tube *t* contains another sliding tube, which carries a double convex lens. The effect of those parts is as follows: the thick lens throws a great deal of light from the candle upon the image. And to increase that light still more a reflector is often, but not always, placed on such lanterns; for as the flame is in the focus of the reflector, the light proceeds in parallel lines from the reflector to the lens. The image being thus well illuminated, sends forth rays from every point, which, by passing through the lens, are converged to a focus upon the wall and form the large images, as is shewn in fig. 10.

The "phantasmagoria" is like the magic lantern, only instead of painting the figures on transparent glass, all the glass is opaque, except the figure only, which being painted in transparent colours the light shines through it, and no light can fall on the screen, but what passes through the figure. The screen is very thin silk between the spectators and the lantern, and by moving the lantern backwards or forwards, the figures seem to recede or approach.

A multiplying glass is made by grinding down the side of a convex glass into several flat surfaces,

Fig. 1.



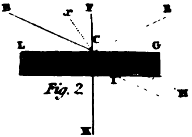


Fig. 2.

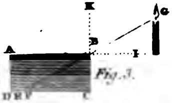
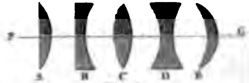


Fig. 3.



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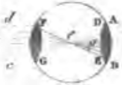


Fig. 5.

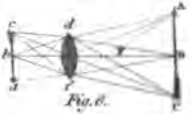


Fig. 6.

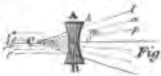


Fig. 7.

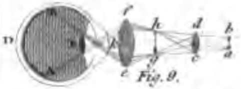
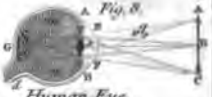


Fig. 9.

Fig. 8.



Human Eye.

Magic Lanthorn.

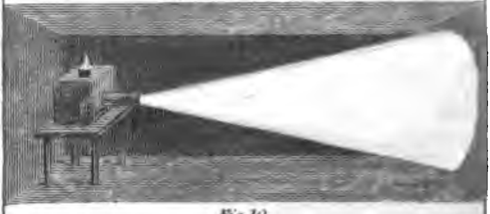


Fig. 10.

Cooper sculp.

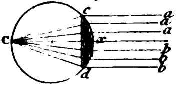
Published by J. Harris, St. Pauls Ch. Yd. [illegible].

[illegible] ex[illegible] [illegible] but [illegible] The lantern [illegible] closed on every side, so that no light can [illegible] out of it, but what passes through the [illegible] circumference of this lens there is [illegible] the lantern, which has a lateral [illegible] side; [illegible] this the [illegible] a [illegible] painted small images, is moved in an [illegible] The [illegible] of the tube [illegible] which carries a [illegible] These parts [illegible] the thick lens [illegible] great degree of light [illegible] And [illegible] still more [illegible] is often, but not always [illegible] on [illegible]; for [illegible] [illegible] The [illegible]

[illegible] except the [illegible] transparent [illegible] and no light can [illegible] but what passes through [illegible] very [illegible] between the [illegible] words, [illegible] seem to [illegible]

A multiplying glass is made by grinding down the side of a convex glass into several flat surfaces,

Fig. 1.



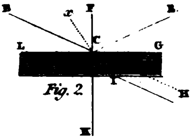


Fig. 2.

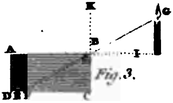


Fig. 3.

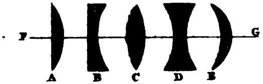


Fig. 4.

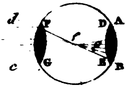


Fig. 5.

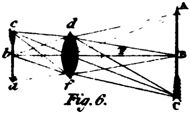


Fig. 6.

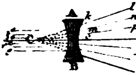


Fig. 7.

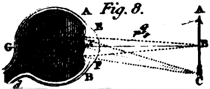


Fig. 8.

Human Eye.

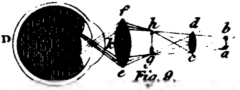


Fig. 9.

Magic Lanthorn.

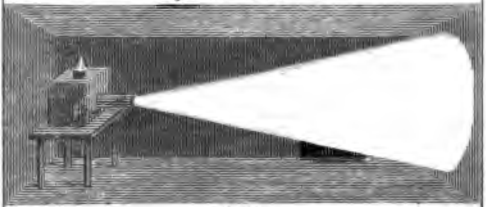


Fig. 10.

Cooper sculp.

Published by J. Harris, St. Pauls Ch. Yd. 1811.

and the object will appear multiplied into as many different objects as the glass contains sides. See PRISM. TELESCOPE.

OPTION, in law, every bishop, whether created or translated, is bound immediately after confirmation to make a legal conveyance to the archbishop, of the next avoidance of such dignity or benefice belonging to the see, as the archbishop shall choose, which is therefore called an option.

ORACLE, in the history of superstition and imposture, a pretended revelation of future events, or the will of supernatural powers, through the medium of a priest or priestess, the most famous of which was that of Apollo, at Delphi.

ORATION, in rhetoric, a speech or harangue, composed according to the rules of oratory, and spoke in public. Orations may be reduced to three kinds, demonstrative, deliberative, and judicial. To the *demonstrative* kind belong panegyrics, congratulations, &c. to the *deliberative*, persuasion, exhortation, &c. to the *judicial*, accusation, confutation, &c.

ORATOR, *public*, an officer of considerable dignity in the universities of England. He carries on or superintends correspondence, and is on all occasions the mouth of the whole. He delivers sentences of prizes, notifies honorary degrees, and presents and extols young noblemen who are to take their degrees as such.

ORATORIO, in the Italian music, a sort of sacred drama of dialogues, containing recitations, duettos, trios, ritornettos, choruses, &c. The subjects of these pieces are usually taken from scripture, or the legend of some saint. These performances are much used in the Roman Catholic countries during Lent; and, for many years past, in England.

ORATORY, a closet or small apartment near a bedchamber, furnished with an altar, crucifix, &c. for private devotion; or a small chapel.

ORBIT, in astronomy, the path of a planet or comet in its course round the sun: thus the earth's orbit is the curve which it describes in its annual revolution, and which is usually called the ecliptic. The orbits of all the planets are ellipses, (see CONIC SECTIONS) having the sun in their common focus: but that of the earth loses much of apparent regularity by the action of the moon; as does that of Saturn by the action of Jupiter, when they happen to be in conjunction.

ORCHIDEÆ, in botany, consist of the Orchis, and other plants that resemble it in habit, powers, and sensible qualities. The flowers are hermaphrodite, and placed at the summit of the stalk, either in a spike, or in a panicle. The flowers of the different species are remarkably various and singular in their shape, resembling different kinds of animals or insects. In the butterfly orchis, the plant has ovate bulbs, tapering to a point at the base; thick fleshy fibres proceed above them from the base of the stem: one of these bulbs is always wrinkled and withered, while the other is plump and delicate: the first is the parent of the stem; the second is the offset, from the centre of which the stem of the succeeding year is destined to rise. Such are the means made use of by nature not only to disseminate plants, but to enable them to change their place, and thus to draw in fresh nourishment. The second root is always about half an inch from the centre of the first, so that in a few years, the plant will have marched several inches from the place of its first existence.

ORDEAL, a test, in which an appeal was made to God, to manifest the truth, by leaving nature to its ordinary course, if the accused were guilty; by interposing a miracle, if innocent. This mode of distributing justice in criminal charges prevailed, during the middle ages, throughout almost the whole of Europe. In England it existed from the time of the Confessor, to that of Henry the Third, who abolished it by declaration: while it lasted, the more popular modes of resorting to it where those of fire or the hot iron, and of water; the first for freemen and people of rank, the second for peasants. The method of administering the ordeal by fire, in England, was by placing nine red-hot plough shares in a line, at certain distances from each other, and requiring the person accused to walk over them with naked feet. If his feet always alighted in the spaces between the shares, so that he passed over them unhurt, his success was deemed a divine assertion of his innocence; if, on the contrary, he was burnt, the disaster was an oracular proof of his guilt. The ordeal by water was of two kinds; here, the prisoner, if innocent, having put his arm or leg into scalding water, brought it out unhurt, or was plunged into cold water, where his body swam supernaturally.

Modes of trial so liable to human collusion, and founded upon unwarranted ideas of the divine providence, have deservedly passed away; but the fact of their former existence remains attested, by a form of words still required to be used by a person arraigned for trial. Such a one, in the days of ordeals, had it in his choice to put himself upon God and his country, or upon God alone. In the former case, he professed his readiness to abide the decision of a jury, in the latter he appealed to the ordeal, as to the immediate judgment of God. At present, the prisoner, on pleading "not guilty," and being asked, "how he will be tried?" a question which alludes to the choice formerly allowed, is always to answer, "By God and the country;" so that, in reality, the question and reply have, now, no meaning.

Order, in architecture, a distinct stile, or system of proportions, or regular arrangement of the projecting parts of a building, particularly the column, so as that it shall possess that unity of expression which gives pleasure to the mind.

Now, this unity, which we require, as well in poetry, music, and the graphic arts, as in architecture, is a unity or *oneness* of idea, in an individual object, not a sameness of all objects: accordingly, we admire beauties of very various kinds. There is a graceful wildness which, absolutely from the want of a word, we call picturesque; there are neatness, elegance, gracefulness, grandeur and sublimity. The last, perhaps, is almost beyond the reach of architecture, since one of its chief sources is a *vastness* that, in a degree, overpowers the human faculties; but the other species of beauty are each exemplified by some peculiar order. There are three which have been received from the Greeks: the Doric, the Ionic, and the Corinthian. To these, by a mixture of their proportions, the Romans added two, the Tuscan, and the Composite, which, with the former, make what are usually denominated the five orders of architecture.

The column, in every order, has been very naturally supposed to have originated in an imitation of the trunks of trees, materials which those who first erected wooden buildings would doubtlessly employ for their support. The gradual metamorphosis of the tree into the column, suggests itself, indeed, so obviously to the mind, that the progress of art, in this instance, scarcely requires to be traced. If the first architect used the trunks exactly as he found them, he that worked at greater leisure would infallibly so far improve upon this contrivance as to select trees of nearly equal size, and trim away whatever, in their new situation, savoured of deformity. Taste would gradually refine; the proportions of that which appeared beautiful would be ascertained; and fixed rules would be established. The orders originated in the mere necessities of life; but a refined age adopted and embellished them. The proportions of the columns were regulated by those of the human body. The Doric was compared with a man of strong make, the Ionic with a woman, and the Corinthian with a girl. The Tuscan is more massy than the Doric, and the Composite more gay than the Corinthian. See ARCHITECTURE.

To determine the proportions of the Tuscan order, any height being given, divide it into ten equal parts, called diameters, that is, parts equal to the thickness of the shaft at the bottom, and of these parts, or diameters, allow two to the pedestal, seven to the column, and one and three quarters to the entablature: the Doric order contains twelve diameters and one third; the Ionic thirteen and a half; the Corinthian fourteen and a half; and the Composite fifteen and a third.

Order, a term used in astronomy, and applied to the motion of a planet. Planetary bodies are said to go according to the order of the signs, when the apparent motion is direct, proceeding from Aries to Taurus, thence to Gemini, &c. Their apparent motion is contrary to the order of signs, when they seem to go backwards from Pisces to Aquarius, &c.

Order, in natural history, a subdivision of a class, which is itself farther divided into genera, as these are into species. The orders in the Linnæan system of botany are founded on the number of styles or female organs. They are all expressed by a single term, which is of Greek etymology, and is significant of the character of the order to which it is applied.

Orders, *military*, or orders of knighthood or chivalry, institutions originally intended for the defence of the Christian Faith; but, among the moderns, designed to enable kings and princes to confer marks of honour.

Orders, *religious*, congregations or societies of monastics. An order consists in the rules to be observed by those who enter it; thus some orders are more austere than others, and one order dresses in white, while another is habited in black; and synonymous with the expression "the order of St. Francis," is, "the rule of St. Francis."

Ordinary, in general signifies *common*, *usual*; thus an ambassador or envoy in ordinary, is one sent to reside continually in the court of some foreign prince or state, in order to preserve a good understanding, and watch over the interest of his own nation.

This term is also applied to several officers in the royal household, who attend on common occasions, as, physician *in ordinary*.

ORDINARY, in common and canon law, one who has ordinary, or immediate jurisdiction. In which sense, archdeacons are ordinaries; though the appellation is more frequently given to the bishop of the diocese, who has the ordinary ecclesiastical jurisdiction. The archbishop is the ordinary of the whole province, to visit, and receive appeals from inferior judicatures.

ORDINARY *of Newgate*, a clergyman who attends in ordinary upon the prisoners in that gaol, preaches and reads prayers in the chapel, and attends and prays with condemned malefactors at the place of execution.

ORDINARY, or *honourable ordinary*, in heraldry, a denomination, given to the ten following charges: the chief, the pale, the bend, the fesse, the bar, the saltier, the chevron, the bordure, and the orle.

ORDINATION, the conferring holy orders, or initiating a person into the priesthood. In the church of England, some years ago, almost any person, so disposed, might be ordained; but, at present, a degree of strictness, more or less, according to the habits of each individual bishop, is observed. The first thing necessary on application for holy orders, is the possession of a title; that is, a sort of assurance from a rector to the bishop, that, provided the latter finds the party fit to be ordained, the former will take him for his curate, with a stated salary. The candidate is then examined by the bishop, or his chaplain, respecting both his faith and his erudition: and various certificates are necessary, particularly one, signed by the clergyman of the parish in which he has resided during a given time. Subscription to the thirty-nine articles is required, and a clerk must have attained his twenty-third year before he can be ordained a deacon; and his twenty-fourth to receive priest's orders. In the church of Scotland, where there are no bishops, the power of ordination is lodged in the presbytery.

ORDNANCE, a general name for great guns of every description.

ORDNANCE, *office of*, an office kept within the Tower of London, which superintends and disposes of all the arms, instruments, and utensils of war, both by sea and land, in all the magazines, garrisons, and forts in Great Britain. The principal officers of the ordnance are, 1. the master general, from whom are derived all orders and dispatches; 2. the lieutenant-general, who receives the orders of the former, directs the firing of guns on occasions of rejoicing, and sees the train of artillery fitted out when ordered to the field; 3. the surveyor-general, who inspects the ordnance, stores, and provisions of war, in the custody of the store-keepers, allows bills of debt, keeps a check upon the labourers, &c. 4. the treasurer; 5. the clerk of the ordnance; 6. the clerk of the deliveries.

ORE, in natural history, the compound mineral glebe, earth, stone, or other substance, which contains metallic particles. An ore is a metal in the state in which it exists in the earth. It may be either native, that is pure, and uncombined with any other substance, or alloyed with another metal, or in a state of oxyde, or a sulphuret, or a carburet, or of a metallic salt. The ores of metals may be analyzed in the humid or dry way. The first is effected with the aid of acids, and other liquid agents, and may be accomplished by very simple means. If sulphur be present in the ore, it should be separated by roasting. No solvent will act on all the metals: thus nitric acid will not act on gold and platina: and the nitro-muriatic acid, that is, a mixture of nitric and muriatic acids, which dissolves these metals, has no action on silver.

Organ, in general, an instrument or machine designed for the production of some certain action or operation; in which sense, the mechanic powers, machines, and even the veins, arteries, nerves, muscles, and bones of the human body may be called organs.

The organs of sense are those parts of the body by which we receive the impressions or ideas of external objects.

Organ, in music, a wind instrument, very antiently invented, but little used before the eighth century. It is supposed to be of Greek origin. St. Jerome mentions an organ with twelve pair of bellows, which might be heard at the distance of a thousand paces, or a mile; and another at Jerusalem, which might be heard at the mount of Olives. There is one in the cathedral church of Ulm, in Germany, that is ninety-three feet high, and twenty-eight broad: the largest pipe is thirteen inches in diameter, and it has sixteen pair of bellows. The size of an organ is usually expressed by the length of its largest pipe.

ORGAN, *Hydraulic*, a musical machine which plays by water, instead of wind.

ORGANZINE, a description of silk usually imported from Italy into this country. The process which the silk undergoes to bring it into this state, consists of the following operations. 1. The silk is wound from the skein upon bobbins. 2. It is then sorted. 3. It is twisted on a mill in the single thread. 4. Two threads thus spun are doubled, or drawn together through the fingers of a woman, who, at the same time cleans them. 5. It is then again thrown by a mill, that is, the two threads are twisted together, and, at the same time, wound in skeins upon a reel. 6. The skeins are sorted, to the different degrees of fineness, and then the process is complete. Formerly nothing but Italian silk was thrown into Organzine; but now the finer sorts of silk from the East Indies may be converted into it.

ORIOLUS, the oriole, a genus of birds of the order Picæ, of which there are forty-five or fifty species. The birds of this genus are natives of America: they are clamorous and voracious: appear in flocks, feed on fruits and grain. Oriolus icterus, or the Banana bird, is found in all the Caribbee Islands, feeding on insects, and hopping like a magpie. These birds are domesticated in America for the express purpose of destroying insects. In a state of nature, four or five will attack a large bird, and appear, after tearing it to pieces, to divide the spoil with much discrimination. They will occasionally attack the human race. The Oriolus of Baltimore, or Baltimore bird, so called by way of eminence, is named by the natives the *fire bird*, because its feathers, when most brilliant, naturally excites the idea of fire.

ORION, in astronomy, a constellation consisting of eighty stars, enumerated in the British catalogue, but the lately improved telescopes have discovered several thousand more: of these there are two of the *first* magnitude, viz. Regel and Betelguese: four of the second, viz. Bellatrix on the left shoulder, and three in the belt, lying nearly in a right line, and at equal distances from one another.

ORNITHOLOGY, that branch of natural history which considers and describes birds, their natures and kinds: their form external and internal, and teaches their economy and uses. Birds are arranged in the Linnæan system, according to the form of their bills, into six orders, viz.

"Accipitres," as eagles, vultures, and hawks: These are a rapacious tribe, feeding on carcases however putrid, but, unless pressed with hunger, seldom attacking living animals: they are bold, gregarious, fly slowly, unless when very high in the air: they have an exquisite sense of smell.

"Picæ," as crows, jackdaws, parrots, &c. These live in pairs: have their nests in trees, and the male feeds his mate while she is sitting: their food is various filthy substances.

"Anseres," as ducks, geese, swans, gulls, &c. These are frequently polygamous: the mother takes little care in providing for their young: they build their nest mostly on the ground: their food fish, frogs, worms, and aquatic plants.

"Grallæ," as herons, woodcocks, ostriches, &c.

These have their nest on the ground: they live on marsh animalcules: their legs are naked above the knees.

"Gallinæ," as peacocks, pheasants, turkies, common fowls, &c. The food of these birds consists of grain and seeds, which they scratch from the ground and macerate in the crop: they make their nest on the ground, with very little care; they are polygamous, and fond of rolling in the dust, and teach their young to collect food.

"Passeres," including sparrows, larks, swallows, &c. This order is divided into the *pure* or such as feed on grain; and the *impure* or those who live on insects. They live chiefly in trees and hedges, are monogamous, vocal, and feed their young by thrusting the food down their throats. Birds are distinguished from quadrupeds by their laying eggs: they are generally feathered, but some few are hairy, and instead of hands and fore legs they have wings. Their eggs are covered with a calcareous shell, and they consist of a white, or albumen, which first nourishes the chick during the incubation; and a yolk, which is so suspended within it as to preserve the side on which the little rudiment of the chicken is situated continually uppermost and next to the mother that is sitting upon it. The yolk is, in a great measure, received into the abdomen of the chicken, a little before the time of its being hatched, and serves for its support, like the milk of the quadruped, and like the cotyledons of young plants, until the system is become sufficiently strong for extracting its own food out of the ordinary nutriment of the species. The generic characters of birds are taken from the bill, tongue, nostrils, cere, caruncles, and other naked parts.

Orphan, a fatherless child or minor; or one that is deprived both of father and mother. The lord-mayor and aldermen of London have the custody of the orphans of deceased freemen, and also the keeping of their lands and goods: accordingly, the executors or administrators of freemen leaving such orphans, are to exhibit inventories of the estate of the deceased, and give security to the chamberlain of London for the orphan's part. The lord-chancellor is the general guardian of all orphans and minors throughout the realm.

Orrery, a curious machine or movement, for representing the motions of the heavenly bodies, so called because one, copied from the original invention of a Mr. Graham, was first made for the earl of Orrery; and otherwise known by the name of *planetarium*. It consists of representations of the planets, and of the zodiac, and other lines imagined by astronomers. By means of an orrery, persons who have not leisure to study astronomy may, in the space of a few days, obtain a competent knowledge of several of the celestial phenomena, and especially, release their minds from the common prejudices respecting the motion of the earth: its principal use being to render the theory of the earth and moon intelligible, and to make evident to the senses the causes of those appearances that depend on the annual or diurnal rotation of the earth; and the monthly revolutions of the moon.

Orthography, that part of grammar which teaches the nature and affections of letters, and the just method of spelling or writing words.

ORTHOGRAPHY, in geometry, the art of drawing or delineating the fore right plane of any object, and of expressing the heights or elevations of each part. In architecture orthography is the elevation of a building.

ORTHOGRAPHY, in perspective is the fore-right side of any plane, that is the side or plane, that lies parallel to a straight line, and may be imagined to pass through the outward convex points of the eyes, continued to a convenient length.

ORYCTOLOGY, is the science which teaches the natural history of those animal and vegetable substances which are dug out of the earth in a mineralized state.

OSCILLATION. See PENDULUM.

OSSIFICATION, the formation of bones, but more particularly the conversion of parts naturally soft, to the hardness and consistence of bones.

OSTREA, the oyster, a genus of the Vermes Testacea, of which there are said to be 150 species, divided into sections: most of this genus are furnished at the hinge internally with numerous transverse grooves in each valve, and are distinguished from the genus area, in not having teeth alternately locking in each other. Scallops will leap out of the water to the distance of half a yard, and opening their shells, eject the water within them, after which they sink under the water, and suddenly close the shells with a loud snap. The Ostrea maxima, a very large oyster found in most European seas, whence they are dredged up and pickled for sale. The shell of this, is that which was formerly worn by pilgrims on the hat or coat, as a mark that they had crossed the sea for the purpose of paying their devotions in the holy land; in commemoration of which it is still preserved in the arms of many families.

Ottoman, or *othoman*, an appellation given to the Turkish empire, from Othomanus, or Osmanhus, the first emperor of the present family.

Oval, the method of describing an oval or elipse is by means of a string, the length of which is equal to the greater diameter of the intended oval, and which is fastened by its extreme ends to two pins, placed in its longest diameter, then by holding it always stretched out with a pin or pencil carried round the inside, the oval is described, which will be longer or shorter as the two fixed points are farther apart.

Overt, open, from the french *ouvert*: thus, in law, an overt-act, is something actually done, and capable of clear proof; and such an act must be alledged in every indictment for high-treason.

Overture, an opening or prelude. The overture of the theatre or scene, is a piece of music usually ending with a fugue; the overture of a jubilee is a general procession.

Outlaw, one that is deprived of the benefit of the law, and therefore held to be out of the king's protection. Where an original writ, and those which follow, are returned by the sheriff, indorsed "*non est inventus*" ("he is not to be found") and after a proclamation made for the party to appear, if he omits so doing, an outlawry is next obtained by the prosecutor. Formerly, no one could be outlawed, except in a case of felony, which being punishable with death, and by way of terror, all persons were left at liberty to slay an outlaw: but outlawry may now be generally resorted to; and, on the other hand, the sheriff only, and he on a legal warrant, may put a man accused of felony to death. An infant under age, or a woman, neither of whom are ever sworn to allegiance, cannot be an outlaw; but are said to be *waives* and to be *waived*.

Outlawry, a process which lies in indictments of treason, felony, trespass, and conspiracy; and in many civil actions, as of debt or of covenant. On an outlawry for felony, the person forfeits his lands, goods, and chattels. In personal actions, the goods and chattels only are liable; and they are forfeited to the king, with the profits of the lands; for the party being without the law, is incapable of taking care of them himself. In case of either treason or felony, an outlawry may be reversed by writ of error, or plea; but the party must then stand trial for the offence on account of which he was outlawed.

Oxalic *acid*, in chemistry, is found native in some acid vegetable juices, particularly in the Oxalis acetocella or wood-sorrel. It is naturally united with a quantity of potash, not sufficient for complete saturation, forming what has been long known under the name of "essential salt of sorrel." The great attraction which this acid has for lime renders it of great utility in detecting that substance.

Oxalic acid combines with alkalies, earths and metallic oxides, and the salts thus formed are denominated Oxalates.

Oxyde, Oxyd, Oxide, in chemistry; one of the first and most ordinary changes to which metallic substances are subject, is their combination with oxygen. The process is called oxydation, and the new substance is an oxyde. Some metals are easily oxydated, as iron and tin, and they require to be defended from the action of the air in order to be preserved from *rust* which is a true oxyde. Others; as gold and platina, scarcely change in any length of time though ever so much exposed to the atmosphere.

Oxygen, one of the *gases*, or artificial airs, obtained by chemical process; a component part of the atmospheric air; and one of the bodies at present reckoned simple or primitive, never having been decompounded. Oxygen is colourless, invisible, and elastic, like common air. If a lighted taper be let down into a jar of oxygen-gas, it burns with such splendor that the eye can scarcely bear the glare of light, and at the same time produces a much greater heat than when burning with common air. It was proved long ago, by Boyle, that animals cannot live without air; and by Mayow, that they cannot breathe the same air for any considerable length of time. Dr. Priestley, and several other philosophers, have shown, that animals live much longer in the same quantity of oxygen-gas than of common air.

Atmospherical air contains about 27 parts in the hundred of oxygen-gas. It has been proved by a great number of experiments, that no substance will burn in common air, previously deprived of all the oxygen that it contains; but combustibles burn with great splendor in oxygen-gas, or in other gases to which oxygen has been added: oxygen, therefore, is absolutely necessary for combustion. It has been proved, by many experiments also, that no breathing animal can live for a moment in any air or gas which does not contain oxygen: oxygen, therefore, is absolutely necessary to respiration. When substances are burnt in oxygen-gas, or in any other gas containing oxygen, if the air be examined after the combustion, a great part of the oxygen will be found to have disappeared. If charcoal, for instance, be burnt in oxygen-gas, there will be found, instead of part of the oxygen, another very different gas, known by the name of carbonic-acid gas. Exactly the same thing takes place when air is respired by animals. Part of the oxygen disappears, and its place is occupied by substances possessed of very different properties. Oxygen-gas, therefore, undergoes some change during combustion, and during respiration. This gas is emitted from nitre, on the application of heat; and has been variously called dephlogisticated air, empyreal air, and vital air.

Oyez *(hear!)*, a french phrase, anciently introduced into English public proceedings, and still used by criers in courts, to procure silence before they make a proclamation.

Oyer and terminer *(to hear and determine)*, a commission directed to the judge of assize, and other gentlemen, empowering them to *hear and determine* all causes. See Assize.

P.

P, the fifteenth letter, and the eleventh consonant of the alphabet; the sound of which is formed by expressing the breath somewhat more suddenly than in forming the sound *b*, in other respects, these two sounds are very much alike, and are often confounded with one another. When *p* stands before *t* or *s*, its sound is lost as in psalm: when placed before *h*, they together have the sound of *f*: among astronomers P. M. is used to denote post meridian, or the afternoon. As a numeral P signifies the same as G, viz. 400, and with a dash over it $\bar{P}$, 400,000. Among physicians P. denotes pugil, or the eighth part of a handful.

Pace, a measure taken from the space between the two feet of a man in walking, usually reckoned two feet and a half.

Packers, persons whose employment it is to pack up all goods intended for exportation, which they do for the great trading companies of London.

Pacific ocean, or South Sea, that vast sea which separates America from Asia. It is called *pacific* on account of the moderate weather the first mariners who sailed in it met with between the tropics; and *south*, because the Spaniards crossed the isthmus of Darien from north to south, when they first discovered it. With regard to America it is the *western* ocean.

Paganism, the religion of the heathen world, in which the Deity is represented under various forms, and by all kinds of images or idols; it is therefore called idolatry, or image worship. The theology of the Pagans was of three sorts, fabulous, natural, and political or civil. The first treats of the genealogy, worship, and attributes of their deities, who were for the most part the offspring of the imagination of poets, painters, and statuaries: the natural theology of the Pagans was studied and taught by the philosophers, who rejected the multiplicity of Gods introduced by the poets, and brought their theology to a more rational form. The political or civil theology of the Pagans was instituted by legislators, statesmen, and politicians, to keep the people in subjection to the civil power. This chiefly respected their temples, altars, sacrifices and rites of worship.

PAGE, a sort of servant of honour. The pages in the royal household are various, and have various offices assigned them; as pages of honour, pages of the presence chamber, and pages of the back-stairs.

PAGOD, or *Pagoda*, an Hindû word, which Europeans report to have three significations:—1, an idol; 2, the temple in which an idol is worshipped; 3, coins of gold and silver.

PAINTING, the art of filling up the outlines of objects represented on a flat surface, and giving them, by colour and shadow, or by shadow alone, the appearance of reality. The following rules of criticism in painting have been laid down:

1. The subject must be well imagined, and, if possible, improved in the painter's hands; he must think well as an historian, poet, or philosopher; and more especially as a painter, in making a

wise use of all the advantages of his art, and in finding expedients to supply its defects.

2. The expression must be proper to the subject, and the characters of the persons; it must be strong, so that the dumb-show may be perfectly and readily understood; every part of the picture must contribute to this end; colours, animals, draperies, and especially the attitudes of the figures; and, above all, the hair of the heads.

3. There must be one principal light, and this and all the subordinate ones, with the shadows and reposes, must make one entire and harmonious mass; the several parts must be well connected and contrasted, so as to make the whole as grateful to the eye as a good piece of music to the ear: from which excellence results, that the picture is not only the more pleasing, but also the better understood.

4. The drawing must be just; nothing must be flat, lame, or ill-proportioned; and the proportions should vary according to the characters of the persons drawn.

5. The colouring, whether gay or solid, must be natural, beautiful, clean, and such as delights the eye, in shadows, as well as in lights and middle tints; and the colours, whether they are laid on thick, or finely wrought, must appear to have been applied by a light and accurate hand.

6. Nature must be the obvious foundation of the piece; but nature must be raised and improved, not only from what is commonly seen to what is rarely met with, but even yet higher, from a judicious and beautiful idea in the painter's mind.

With respect to the improvement of nature, recommended in the sixth rule, it should be remarked that *selection* is a duty of the first importance, in the practice of every imitative art. It is to this operation of the mind that belongs the grand requisite, *taste*. That nature can be improved in the hands of the artist ought, perhaps, to be denied without hesitation; but that her beauties may be selected, and shown in their most exquisite or their strongest light, is certain: and there is one principal reason, among many others, why the artist must not fail to make use of this discrimination: as in copying he will infallibly lose a great portion of the grace or energy of his model, it is necessary that he should supply the deficiency by means of attractions more within his reach.

Painting is of various kinds, according to the materials used, the matter upon which they are applied, and the manner of applying them; as painting in oil, in fresco, in water-colours, and encaustic painting.

Painting *in enamel*. See *Enamel*.

Painting *Encaustic*, an ancient art, which consists in the use of wax, to give a gloss to the colours, and preserve them from the injuries of the air. After having been long lost, it was revived by M. Bachelier, in 1749, and brought into public notice by count Caylus, in 1753. It has also been carried to a superior degree of perfection by Miss Greenland, who communicated her method to the Society of Arts, in 1787, and was rewarded with the prize. This lady's directions are as follow:

Take an ounce of white wax, and the same weight of gum-mastic, powdered: put the wax in a glazed earthern vessel, over a very slow fire; and when it is quite dissolved, strew in the mastic, a little at a time, stirring the wax continually until the whole quantity of gum is perfectly melted and incorporated: then, throw the paste into the cold water; and when it is hard, take it out of the water, wipe it dry, and beat it in one of Wedgwood's mortars, observing to pound it at first in a linen cloth, to absorb drops of water that will remain in the paste, and would prevent the possibility of reducing it to a powder, which must be so fine as to pass through a thick gauze. It should be pounded in a cold place, and but a little while at a time; as, after long beating, the friction will, in a degree, soften the wax and gum, and instead of their becoming a powder, they will return into a paste. Make some strong gum-arabic water; and when you paint, take a little of the powder, some colour, and mix them together with the gum-water. Light colours require but a small quantity of the powder, but more of it must be put in proportion to the body and darkness of the colours; and to black there should be almost as much of the powder as of colour.

Having mixed the colours, and no more than can be used before they grow dry, paint with fair water, as is practised in painting with water colours; a ground to the wood being first painted of some proper colour, prepared in the same manner as is described for the picture. Walnut-tree and oak are the sorts of wood commonly made use of in Italy for this purpose. The painting should be very highly finished, otherwise, when varnished, the tints will not appear united.

When the painting is quite dry, with rather a hard brush, passing it one way, varnish it with white wax, which is put into an earthern vessel, and kept melted over a slow fire, till the picture is varnished, taking great care that the wax does not boil. Afterwards, hold the picture before a fire, near enough to melt the wax, but not to make it run; and when the varnish is entirely cold and hard, rub it gently with a linen cloth. Should the varnish blister, warm the picture again, very slowly, and the bubbles will subside. When the picture is dirty, it need only be washed with cold water.

PAINTING *in Fresco*, that is, in the *open air*, a method of painting adapted to sustain the injuries of the weather. The principal colours employed in this art, and which are ground and worked with water, are lime, slaked long before, and marble-dust, for *white*; ochres, for *red* and *yellow*; verditer, lapis-lazuli, and smalt, for *blue*; chalk, for *black*; most of them are found to grow brighter as the mortar on which they are laid becomes dry. The painting is performed while the wall is wet, and thus incorporated with its ground. The brushes and pencils ought to be long and soft, and the colours full and flowing. The whole should be done quickly, and without retouching.

PAINTING *in Oil* is performed on canvas, wood, stone, plaster or metal. On whatever body, the first operation is that called *priming*. In using canvas, the cloth is stretched on a frame, and covered with a layer of size or paste-water, after which it is rubbed with pumice-stone, to take away the knots. By means of the size, the little threads and hairs are all laid close on the cloth, and interstices so filled up that no colour can pass through. When the cloth is dry, ochre, ground in oil, is laid, and it dries with more expedition if mixed with white lead, than if otherwise. When dry, the pumice-stone is again applied; and after this a second layer of colour, which should be of a warm hue, and mixed with such a proportion of turpentine as to deprive it of all gloss; that is, in the technical phrase, render it *dead*. The cloths are usually primed by the colourmen, and in that state purchased for use.

Palatine, or count-palatine, the title of a sovereign prince of Germany. All the princes of that empire were originally servants of the imperial crown. In process of time, they acquired independent authority, and secured that authority to their heirs: among these was the count-palatine, or of the palace, in the German language denominated the pfalzgraf. This officer was a president who decided upon appeals made to the emperor himself, from the judgment of provincial courts. All titles, except that of lord, which is complimentary, and belonged to territory, were originally official, as are those of judge, general, &c. at this day. When Charlemagne had extended the German empire, he sent persons to administer government in the provinces, under the title of dukes; officers, probably, whose duty was partly military, whence their denomination, which is synonymous with that of leaders, or generals; under the dukes, justice was distributed in each district of the province by a comes, count or earl, called in the German, graf, and in the Saxon and

English, gerefa, greve, reve, or sheriff; from these courts lay the appeals already mentioned. The graf was sometimes distinguished by the situation of his district: the graf of a frontier district, or march, was called a mark-graf, whence the synonymous word marquis; usually, the centre of the empire was ruled by an officer whose extent of jurisdiction was greater than the rest, and who bore the title of landgrave; and a town or castle in which the emperor had resided, becoming, through his favour, a burg or borough, the governor of such a one was called a burg-graf: the meaning of these titles, however, gradually changed, and at length, as has been already suggested, in Germany, the possessors of them became co-emperors; in other parts of Europe, they are used as honours, and, as in England, are only the names of gradations of peerage.

Palm, an ancient measure taken from the extent of the hand. The Roman palm was of two kinds, the great one was equal to 8¼ inches English; the small one to three inches. The English palm is equal to 3 inches.

Palm-sunday, in the Christian church, the Sunday next before Easter; so called in memory of the entry of Jesus into Jerusalem, when the people strewed palm-branches in his way.

Pandects, in the civil law, collections made by Justinian's order of 534 decisions of the ancient lawyers, on so many questions occurring in the civil law; to which that Emperor gave the force and authority of law, by an epistle prefixed to them.

Panel, in law, a schedule, or small roll of parchment, in which is contained the names of the jurors returned by the sheriff, to pass upon trial.

PANIC, an ill grounded terror: the origin of the word is from Pan, one of the captains of Bacchus, who with a few men routed a numerous army, by a noise which his soldiers raised in a rocky valley favoured with a great number of echoes: for by this stratagem their numbers appeared much greater than they were. Hence all ill grounded fears have been called *Panic* fears.

PANTALOON, a garment said by some to have been first introduced by the Venetians. It has been remarked that the Irish very anciently wore trowsers of this description; and that Louis XIII. is the first who appears with what we now call *breeches*.

PANTOMETER, the name of an instrument used to take all sorts of angles, distances and elevations.

PAPER, thin sheets of a vegetable substance, used as a vehicle for writing, and so named from the *papyrus*, the leaves of which plant originally did, and still do, serve certain nations for this purpose.

The paper of the Egyptians is made of the *papyrus*, a rush grown on the banks of the Nile, as already mentioned; Chinese paper is of various kinds, as of the rinds of barks of trees, especially of the mulberry, the elm, the bamboo, and the cotton-tree; cotton paper has been in use upward of six hundred years, and is still made in the East-Indies, by beating cotton-rags to a pulp; paper made of straw is now used in London; and a whole genus of aquatic vegetables, known by the name of *conferva*, have lately been applied to this purpose in Germany.

Though this latter may be an original discovery of the professor who has brought it forward, the practice was formerly realized in Scotland, as appears from a notice in Lightfoot's *Flora Scotica*, respecting the *conferva bullosa*, or craw-silk:

"It is a soft substance, and in pure water, where the threads grow long, resembles tow. But in muddy waters, where they are short, it is not unlike cotton; which being carefully collected undried, turns whitish, and has sometimes been used instead of it, either as wadding to stuff garments with, or to make towels or napkins. We have also seen a coarse kind of paper made of it at Edinburgh."

"This substance," says a correspondent of the *Monthly Magazine*, "may be met with in great abundance in almost every ditch and pool, especially old clay-pits, and in most slow streams. In cold weather, it is always below the surface of the water, and forms a mass of yellowish green fibres, very fine, and interlacing each other in every direction. In summer, it rises to the surface in large fleece-like masses, commonly of a deep green colour, and a spungy texture, inclosing numerous globules of air, to which it owes its buoyancy. If raked out of the water, and exposed for a few days to the sun, it closes its green colour, and becomes very tolerably bleached."—Linen paper, or that made of cloth produced from flax, the last species to be mentioned, appears to have been first introduced about the beginning of the fourteenth century; but by whom it was invented is not known. The manufacture of this paper, of which kind are the present sheets, and which may be said to be still exclusively used in Europe, is effected by the following processes. After procuring rags from the dealers in that commodity, the first and most disagreeable operation is that of sorting them. This, however, must be done with care; for upon a due selection depends, in the first instance, the purity of the paper. The rags are then put into the dusting-engine, a circular wire sieve, where they are exposed to running water, and cleansed. They are next conveyed to the mill: there they are put into a large vat or cistern, through which clear water is constantly flowing. In this cistern is placed a cylinder, about two feet in length, set thick round with rows of iron spikes, placed as near as may be without touching each other. At the bottom of the trough are corresponding rows of spikes. The cylinder is made to whirl round with great rapidity; and the iron teeth rend and tear the rags in every possible direction. At length, with the softening assistance of the water, they are thoroughly masticated, and reduced to a fine pulp, while, by the same process, all their impurities are washed away, and they are left perfectly white. This operation is performed in about six hours. For the sake of colour, a quantity of common light-blue, or azure, is sometimes added, which gives the paper a bluish cast: this practice, however, was not formerly in use; the French never entered so fully into it as the English; and even the latter have now generally rejected it, as in the paper that bears these observations.

The fine pulp is next put into a copper of warm water. This is the substance of paper, to which a form is now to be given by means of a mould. This utensil bears a general resemblance to a sieve. In the old manner, its surface was composed of wire bars, crossed with others of a finer texture, the form of which may be discovered by holding paper, made on such moulds, to the light; it is by these wires, which take from the thickness of the paper, and consequently give a transparency, that what are called the water-marks are produced; and the water-marks may be of any form according to the wire-worker's design; as is exemplified in the modern Bank-paper. The paper, however, which is called wire-wove, as the present, and that used for drawing, and which has no other mark than the maker's name, is made upon moulds, the wired bottom of which is extremely fine, with the wires closely interwoven; and some examples of inferior wove paper exhibit this crossing of the wires, as plainly as the bars are perceived in that made after the old manner.

The mould is dipped horizontally into the copper containing the pulp, and immediately taken out: by means of its wooden frame, it retains just so much pulp as is wanting for the thickness of the sheet, while the superfluity returns through the interstices of the wires. A second hand, called a *coucher*, instantly receives it from the dipper, called a *vat-man*; opens the frame, and turns out the sheet (which now has shape, but not consistence), on a cloth of soft felt, which is spread on the ground to receive it. Over this is laid another piece of felt, which receives another sheet of paper, and the pile is thus increased, till forty or fifty sheets are formed. These are then removed to a large screw-press, moved by a long lever, which forcibly squeezes the water out of them, and gives them immediate consistence; after which, the felt and paper are separated, and the latter, which is thrown on one side, while the former is thrown on the other, is taken up with an instrument in the form of the letter T, three sheets at a time, and hung on lines to dry. It hangs for a week or ten days, during which its whiteness is increased; and then passes through the hands of women, called *pickers*, who, with proper instruments, remove knots, dirt, or other imperfections. It is then sized, without which operation it would not bear ink or any liquid. The sheets are just dipped into the size, and taken out again. The exact degree of sizing is a matter of nicety, to be understood only through experience. The paper is hung up to dry a second time; and when this object is completed, it is taken to the finishing room, when the faulty sheets are rejected, and the perfect pressed in dry presses, which give them their ordinary degree of smoothness; counted into quires and reams; and packed for sale to the stationer, by whom they are retailed to the public. The stationer, also, cuts the edges, and causes it, for various purposes, to be gilt, or hot-pressed: which latter operation is performed by means of heated metal-plates. The whole process at the paper-mill occupies about three weeks. The part performed by the power of the mill itself is that of reducing the rags to a pulp, as above described.

Paper, *blotting*, paper not sized, into which liquids readily sink; and which is therefore occasionally used to dry up superfluous ink in writing.

Paper, *marbled*, paper the surface of which is covered with colours, in waved and fanciful patterns. To perform this operation, gum is dissolved in water contained in a trough, and into which each sheet of paper is plunged. The colours are then laid on the surface of the liquor, by means of a brush of hog's hair, and these are waved and intermingled with a stick skilfully drawn along the surface. The sheet of paper, on being drawn up, is coloured accordingly.

Paper *office*, an office belonging to the government, to which some apartments in the ancient palace of Whitehall are allotted; in which all state-papers are deposited.

Papilio, the name of a subdivision of the insect class, when in their *imago*, or third state; that is, that in which they have wings. Every fly is an *imago*; but a moth is called *phalæna*, and a butterfly, *papilio*. The most natural and approved distinguishing names for the several species of insects, which are called the *trivial* names, are taken from the vegetables on which they feed: but in the multitude of *butterflies*, the proportion that belong to extra-european parts of the world is so great, and their several foods so little known, that Linnæus was obliged to adopt a different scheme of nomenclature; and accordingly divided them into sections by the names *equites*, *heliconii*, *danai*, *nymphales*, and *plebii*. The individuals of the section of *equites*, have their names from the Trojan history; those of that of the *heliconii* from the muses; the *danai* from the children of Danaus; the *nymphales* from the nymphs of antiquity; and the *plebii* from the celebrated antients.

In subdividing the *equites*, the classical naturalist arranged them into two troops or bodies; of which one contains those that are sable and have red spots upon their wings, fancifully considered as the mourning nobles of Troy; the other, containing those possessed of gay colours, resembled to the triumphant Greeks. The first, then, are named after the Trojans, and the most decorated of these is styled Priam, the king; the second after the Greeks. In both armies some were kings, and others merely subjects; a circumstance that assists the classification: for as among the splendid insects of this section there are some, the projections of whose hinder wings resemble tails, it is convenient to mark these by royal names.

From this elegant distribution it results, that when an entomologist meets with the name of *Paris*, for example, he knows, from its connection with the subject of the *Iliad*, that the butterfly it designates is of the superb section; from its being that of a Trojan, that it is of a sable colour, with red spots; from its being that of a Trojan of the royal blood, that its hinder wings project, tail-wise. The same precision is also attained in other parts of the system.

Papilionaceous, a term in botany, signifying that general resemblance which the attitudes of the petals of certain flowers bear to a butterfly; as the pea.

Papists, persons professing the Popish religion. See Roman *Catholics*.

Pappus, in botany, *thistle-down*, a sort of feathery or hairy crown, with which many seeds are furnished for the purpose of dissemination. A seed surmounted by a pappus resembles a shuttle-cock, so that it is naturally formed for flying, and for being transported by the wind to a very considerable distance, from its parent plant. By this contrivance of nature, the dandelion, groundsel, &c. are dis seminated and self-sown in places where they would otherwise have never existed.

Par *(equal)*, in commerce, is said of any two things equal in value; and in money-affairs, the equality of one kind of money or property with another: thus, when 100*l.* stock is worth exactly 100*l.* specie, the stock is said to be *at par*; that is, the purchaser is required to give neither more nor less of the commodity with which he parts, than he receives of that which he acquires: thus, too, the *par* of exchange is the equal value of money in one country and another. In the exchange of money with foreign countries, the person to whom a bill is payable is supposed to receive the same value as was paid to the drawer by the remitter; but this is not always the case with respect to the intrinsic value of the coins of different countries, which is owing to the fluctuation in the prices of exchange, among the several European countries and great trading cities. The par therefore differs from the course of exchange in this, that the par of exchange shows what other nations *should* allow in exchange, which is rendered certain and fixed by the intrinsic value of the several species to be exchanged; but the course shows what they *will* allow in exchange; which is uncertain and contingent, sometimes more and sometimes less; and hence the exchange is sometimes above, and sometimes under par.

Parabola. See **Conic** *sections.*

Paradox, in philosophy, a proposition seemingly absurd, but yet really true; as that a right line should continually approach the hyperbola, and yet never reach it.

Parallax, *annual*, the change of the apparent place of a heavenly body, which is caused by being viewed from the earth, in different parts of its orbit round the sun. The annual parallax of the planets is considerable, but that of the fixed stars is imperceptible.

Parallels, or *parallel circles*, in geography, called also, parallels or circles of latitude, are lesser circles of the sphere, conceived to be drawn from west to east, through all the points of the meridian, commencing from the equator, to which they are *parallel*, and terminating at the poles. They are called parallels of the latitude, because all places lying under the same parallel have the same latitude.

Parameter. See Conic *sections*.

Paramount, in law, the supreme lord of the fee. The lords of those honours, or manors, that have other manors under them, are stiled lords-paramount; and the king, who, in law, is chief lord of all the lands in England, is, thus, the lord-paramount.

Parasang, a Persian measure, varying in different ages, and in different places, from thirty to fifty stadia or furlongs.

Parchment, in commerce, the skins of sheep or goats, prepared in such a manner as to render them proper for writing upon.

The skin, being stripped of its wool or hair, placed in a lime-pit, and pared of its fleshy part by means of an iron instrument, is moistened with a rag, and spread over with powdered chalk: the skinner then takes a large pumice-stone, flat at bottom, with which he scours it; and when, by a continuance of similar operations, it is smoothed and softened, it passes from the skinner to the parchment-maker. The latter, while it is in a state of dryness, pares it on a *summer* (a calf-skin stretched on a frame), and, working with a sharper instrument than the skinner, proceeds to take away half the thickness of the skin; after which, it is again smoothed by means of pumice-stone, rubbed over it while placed on a bench covered with sacking, and stuffed with flock. This done, the parchment is fit for use; and the parings are employed in making *glue* or *size*.

PAREMBOLE, a figure in rhetoric, generally confounded with the *parenthesis*. The parembole is, in reality, a species of parenthesis; and its specific character is this, that *it relates to the subject*; whereas, many other passages parenthetically introduced are foreign, being merely accidental thoughts that occur to the mind of the speaker or writer. The following sentence exhibits an example of the parembole:

"Even that privilege which they enjoy of exclusively trying their own members, in case of any accusation that may affect their life (a privilege which we might at first sight think repugnant to the idea of a regular government, and even alarming to the rest of the people), has constantly been made use of by the lords to do justice to their fellow subjects."

PARENTHESIS, a passage so introduced into a sentence or discourse, as that it has no grammatical connection with the rest, and if taken away leaves the sense perfect. If the words of the parenthesis *relate to the subject*, they are called a parembole;

but if to use the expression, they are merely brought in *by the by*, they pass under the generic name of parenthesis, and are faults in composition, unless in works of humour, where they are often beauties:

"After much consultation (for we found the whims of people of fashion come very naturally) we hired a house in one of the streets near Palace-yard, because it was only 100*l.* a year rent, and was so centrical (as my wife called it) to the play-houses and the palace."

Parhelium, or *Parhelion*, in physiology, a mock sun, or meteor, having the appearance of the sun itself, and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple, and sometimes even more numerous. In 1629, one of five suns was seen at Rome, and in 1666, a similar one at Arles.

Parhelia are formed by the reflection of the sun's beams on a cloud properly situated. They are accounted for by supposing an infinity of little particles of ice floating in the air, which multiply the image of the sun by refraction or reflection.

Parish, in ecclesiastical polity, a *district*. Each parish has a church, a parson, and officers for the management of ecclesiastical matters, and the maintenance of the poor. A parish may contain several villages within its limits, though in general it is accounted to contain no more than one. England is said to contain about 10,000 parishes, of which 3845 churches are impropriate: the rest are annexed to colleges, or to church dignities. Many parishes, on account of their extent, have what are called *chapels of ease*; that is, buildings appropriated to the established form of worship, and so situated as to be within the reach of parishioners residing at a distance from the church.

Park, in rural economy, a large inclosure, privileged for beasts of the chace. To render an enclosure a park, a licence must be obtained under the broad seal; but there are parks *in reputation*, though not erected with lawful warrant; and the owner of such may bring his action against any one stealing deer therein. The pulling down walls or pales of parks is an offence equal to that of killing deer.

Parley, a conference with an enemy. To sound a parley, is to make a signal for holding such conference, by beat of drum, or sound of trumpet.

Parliament (*parlement*, speaking), the seat of the legislative authority under the British constitution, composed of the three estates of the realm, viz. the king, the lords, and the commons; the united will of which is absolute, and competent to every act of power. See *King*, *Lords*, and *Commons*.

Though, in modern times, the sessions or sittings of parliament follow each other at their accustomed periods, without interruption, yet it is not a corporation, existing continually, but a temporary assembly, owing its being to the voice of the king, and ceasing when he dissolves it. Thus we say, "The *fourth* parliament of the present reign;" and a member of the house of commons is a member of *the* parliament to serve in which he is elected. A peer or lord of parliament is not a member of any perpetual body, but one who has an hereditary right to a seat in every parliament. See *Peer*.

A parliament is called by the king's writ, or letter, directed to each lord, summoning him to appear; and by writs sent by the lord chancellor under the great seal, commanding the sheriffs of each county to take the necessary steps for the election of members for the county, and the boroughs contained it. On the day appointed for the meeting of the parliament, the king sits in the house of lords, under a canopy, and dressed in his robes, as are all the lords in their's; and, the commons being summoned to the bar of that house, he addresses both houses on the state of public affairs. The commons are then required to choose a speaker, which officer being presented to and approved by the sovereign, the latter withdraws; the commons retire to their own house; and the business of parliament begins.

In the house of lords, the seat of each member is prescribed, according to rank; though, except in the presence of the king, this formality is almost wholly dispensed with. The princes of the blood sit on each side the throne; the two archbishops against the wall, on the king's right hand; the Bishops of London, Durham, and Winchester, below the former, and the other bishops according to priority of consecration. On the king's left hand, above all the dukes, except those of the blood-royal, sit the lord-treasurer, lord-president, and lord privy-seal; then the dukes, marquises, and earls, the individuals of each class taking precedence according to the date of their creation. Across the room are wool-sacks, continued from ancient custom; and on the first of these, immediately before the throne, sits the chancellor, as speaker of the house. On the other wool-sacks are seated the judges, masters in chancery, and king's counsel, who only give their advice on points of law.

In the house of commons there are no peculiar seats for any members. The speaker, only, has a chair appropriated to him, at the upper end of the house; and at a table before him sit the clerk and his assistant.

When the parliament is thus assembled, no member is to depart without leave. Upon extraordinary occasions, all the members are summoned; otherwise, three hundred of the commons is reckoned a full house; and forty may compose a house for the dispatch of business.

Parliaments *of France* were courts of justice: that of Paris was instituted in the same manner, and for the same purposes, as the *aula-regis* (king's-bench) was afterward in England; *viz.* the administration of public justice, and the decision of differences between the king and his barons.

It was in consequence of the judgments awarded by that court that the king proceeded to seize the dominions of the lords or princes against whom a sentence had been passed. The parliament of Paris, as did the other courts of law, grounded its judgment upon the edicts or ordonnances of the king, when it had once enregistered them. When those ordonnances were thought grievous to the subject, the parliament refused to register them: but this it did without any pretension to a share in the legislative authority; it only objected that they were not satisfied that the ordonnance before it was really the will of the king, and then proceeded to make remonstrances against it. On these occasions, the practice was either to yield, and give up the edict, or, if the sovereign resolved to over-rule the opposition, he went to the parliament in person, in military array, and there holding what was called *un lit de justice (a bed of justice)*, declared that the ordonnance before them was actually his will, and ordered the proper officer to register it.

From this view of its proceedings, it will be evident that the parliament of Paris, though instituted as a judicial chamber, had in effect considerable political influence; and, accordingly, the share which this and the other parliaments of the kingdom had in the commencement of the French revolution, was very conspicuous.

There were ten of these parliaments, of which that of Paris was the chief, its privileges and jurisdiction being of the greatest extent. It consisted of six chambers; in one of which, called the grand-chamber, pleadings were heard, while in the five chambers of inquest, processes were adjudged in writing. The parliaments were also courts of appeal.

Parliament *of Sweden*, the assembly of the five estates, of which the king constitutes the first and head; the nobility, representatives of the gentry, colonels, lieutenant-colonels, majors, and captains, of every regiment, the second; the clergy, consisting of the bishops and others, to the number of about two hundred, the third; the burghers, elected by the magistrates and council of every corporation, to the number of about two hundred and fifty, the fourth; and the peasants, chosen by the peasants of every district, from among themselves, and not gentlemen, to the number of about two hundred and fifty also, the fifth.

This parliament usually meets at Stockholm; and after the affairs of state have been represented from the throne, it separates into four several chambers, or houses, in each of which questions are determined by a majority of votes: and, as in Great-Britain, each chamber can by its negative prevent the passing of any law.

Parliament, is also sometimes used for other assemblies than those of the states of a kingdom: thus the assembly of some inns of court, called to consult on their common affairs, is called a *parliament.*

Parody, a popular maxim or proverb; as also a poetical pleasantry, consisting in applying verses written upon one subject to another.

Parson, the rector or incumbent of a parish church.

Participle, in grammar, an adjective formed of a verb, so called because it participates of both a noun and a verb; being variable through the genders and cases like the former, and regarding time, action, passion, &c. like the latter.

Particle, in grammar, a denomination given to all those small words that unite nouns and verbs together, or that express the modes or manners of words, and which are usually made to include adverbs, prepositions, interjections, and conjunctions. Mr. Locke has observed, that it is in the right use of particles that clearness and beauty of a good style more particularly consists. To express the dependence of his thoughts and reasonings, one upon another, a man must have words to show what connection, restriction, distinction, opposition, emphasis, or other quality, he gives to his discourse. This cannot be rightly understood without a clear view of the postures, limitations, exceptions, and other thoughts of the mind. Of these there are a great variety, much exceeding the number of particles that most languages have for their expression; whence it happens that most of these particles have divers, and sometimes almost opposite significations.

Partner, in trade, one having a share in a joint stock. If there be several partners, and a person has dealings generally with one of them concerning their joint trade, whereby a debt becomes due to that person, the debt belongs to all, jointly, and to their survivors; but if the person only deals with one of the partners upon a separate account, in this case, the debt only affects that partner and his executors. If one or more of the joint traders becomes a bankrupt, his or their proportions can only be assigned by the commissioners, to be held in common with the rest who are not bankrupts. If one or two partners become a bankrupt, the commissioners cannot meddle with the interest of the other, since he is not affected by the bankruptcy of his companion. Payment to one partner is payment to all.

Pasquin, a name given to a mutilated statue which stands at the corner of the palace of the Ursini in Rome. The name was that of a cobler famous for his sneers and gibes, and who diverted himself with passing jokes upon all the people who went through his street. After the death of this man, some workmen, who were digging up the pavement before his shop, found in the earth a statue of an ancient gladiator, well executed, but maimed: this they set up in the place where it was found, and by common consent named it Pasquin. Since that time, all satirical papers in that city are attributed to this figure, and either put into its mouth, or pasted on its body.

Pasquinade, a satirical libel fastened to the statue of Pasquin. It is commonly short, merry, and pointed, and written as if addressed by Pasquin to Marforio, another statue at Rome. When Marforio is attacked, Pasquin assists him against his enemies; and when Pasquin is attacked, Marforio assists in his turn. Lampoons of a similar nature are sometimes called pasquinades. The difference between a pasquinade and a satire is, that the end of the latter is to correct and reform, while that of the former is only to ridicule and expose.

Passage, *birds of*, those which at stated seasons of the year remove from one climate to another, and at other stated seasons return to the first; as quails, woodcocks, storks, nightingales, and swallows. The generality of birds that remain in Britain during the winter have strong bills, and are enabled to feed on what that season affords; while those that leave it have generally very slender bills, fitted for feeding on insects. This food disappearing on the approach of winter, it is necessary that they should seek it in warmer regions. As Britain, however, is not the coldest part of the northern world, those birds of passage which pass the summer in countries nearer the pole, visit this island in its winter: thus the fieldfare, the redwing, the woodcock, and the snipe, arrive in autumn, at the time when the summer-birds are departing, and retire in the spring, when the latter return. Of the winter-birds, the two last frequently remain during the whole summer.

Passeres, See Ornithology.

Passion, strong emotions of the soul. Speculative men have classed the passions in various ways; and, according as the view they took of them was comprehensive or minute, differed widely in the statement of their number: hence we are told by some that the breast is susceptible of but one passion, and by others that it entertains no less than eleven. This apparently so wide disagreement, however, regards, as is the case in most other instances of disagreement, the terms only, and not the substance of the argument. When it is said that there is but one passion, and that passion self-love, or the desire of happiness, there seems to be some inaccuracy, inasmuch as self-love might rather be called the *one source* of all the passions.

That self-love is, as it ought to be, habitual in every creature, is certain; but that which is habitual is not a passion. A passion is a temporary emotion, during the continuance of which some one feeling, which constitutes the passion, reigns paramount over every other. Hence it is that no passion can perpetually continue; and hence, also, that passion is overcome by an act of the mind which is called reasoning. A passion, we have said, is a feeling that for a time reigns paramount over others; this feeling, as of love, joy, sorrow, or alarm, is excited by some adequate cause; and whenever any other adequate cause than that which operated first gains a similar influence, the force of the passion is weakened. If the second cause of emotion gains but slight ascendancy, the reign of the passion is only shaken, but if sufficient strength, overthrown. If an opposite passion interfere, while the first is unimpaired, as love with hatred, there ensues a violent conflict; but, if the causes of sensation operate with more mildness, that gentle disputation which is called reasoning. Reasoning may surely be defined, the *act of balancing*: in reasoning upon our desires, we balance desire against desire; in reasoning upon truth, we balance evidence against evidence. When no one idea has sufficient influence over the feelings to forbid the entertainment of others, the mind is capable of reasoning; and in proportion as the power of the several ideas is equal, that of reasoning is perfect.

Rousseau is related by M. de St. Pierre to have observed to the latter, that "when a man begins to reason he ceases to feel." This is undoubtedly true; but if we analyse the matter thoroughly, we shall perhaps conclude that the observation, correctly expressed, would be this: when a man begins to perform the act of balancing feeling against feeling, he ceases to be under the absolute dominion of any *one* exclusively.

A passion, then, is a strong feeling or emotion of the soul, excited by an adequate cause, and existing in such strength as to engross the whole man, and resist the influence of every other cause of sensation. Thus, a lover has been justly said, by a French writer, "to be nothing but a lover;" and we might speak of every other passion in the same phraseology: an angry man is nothing but an angry man; a certain cause has excited his feelings to anger; if an adequate cause of grief should occur, he would become a grieving man, and while he remained so, his anger must cease; if it return, he cannot be a prey to grief during its stay.

In order to form a clear notion of the passions, we must begin with rejecting the phrase that man is possessed of this or that number of passions, and say that he is possessed of *one* quality, that is, susceptibility, which is liable to be acted upon by this or that number of causes. Man, therefore, has not so many feelings, but one feeling, assuming different forms of appearance according to the impression it receives; and the number of passions is exactly that of the circumstances that are important to a sentient creature. Now, these, in a comprehensive point of view, are only of two kinds; those that contribute to its pleasure, and those that are productive of pain. It is for this reason that, according to some, man has only two passions; the desire of happiness, and the aversion to evil; but, subdivided, each order has its genera, and each genera its species. The desire of happiness is separated into love, or the wish to possess that which will impart happiness; hope, which is the expectation of possessing it; and joy, which is the assurance of possession. The aversion to evil is separated into fear, which belongs to the dread of evil; grief, which belongs to the presence of it; and anger, which resents it. These, again, to which, also, other genera may be added, are distinguished into species; as to fear belongs terror and horror; and to anger, envy, jealousy, hatred, and malice.

Some think the most natural division of the passions is into pleasurable and painful:

"Love, hope, and joy, fair pleasure's smiling train;
"Fear, grief, and hate, the family of pain;"

but this is looking to their effects, not to their nature.

Locke has enumerated them as follows: By reflecting on the various modifications or tempers of the mind, and the internal sensations which pleasure and pain, good and evil, produce in us, we may thence form to ourselves the idea of our passions: thus, by reflecting upon the thought we have of the delight which any thing is apt to produce in us, we form an idea which we call love.

Desire is that uneasiness which a man feels in himself upon the absence of any thing, the present enjoyment of which causes delight.

Joy is a delight of the mind, arising from the present, or assured approaching possession of some good.

Sorrow is an uneasiness of the mind upon the thought of a good lost, or the sense of a present evil.

Hope is a pleasure in the mind, upon the thought of a probable future enjoyment of a thing which is apt to delight.

Fear is an uneasiness of the mind, upon the thought of a future evil likely to befal us.

Anger is a discomposure of the mind, upon the receipt of injury; with a present purpose of revenge.

Despair is the thought of the unattainableness of any good.

Envy is an uneasiness of mind, caused by the consideration of a good we desire, obtained by one we think should not have had it before us."

Passion, *in medicine*. The passions of the mind chiefly affect the stomach, inverting its motion, and hindering digestion and chylification; from which disordered state of the economy many crudities arise, productive of various diseases: hence it is dangerous to sit down to a meal immediately after violent agitation.

Passions, in physiognomy, are expressed by the general attitude of the figure, but particularly by the features of the face: for their several expressions, the reader is referred to the well-known designs of Le Brun.

Passion-*week*, the week immediately preceding the festival of Easter; so called, because in that week our Saviour's passion and death happened. The Thursday in this week is called *Maunday Thursday*, the Friday, *Good Friday*, and the Saturday the great-sabbath.

Passover, a solemn festival of the Jews, celebrated on the fourteenth day of the month following the vernal equinox. The origin of this institution is related in the twelfth chapter of the book of Exodus, which records the *passing over* the houses of the Hebrews by the angel who put to death the first born of the Egyptians. Beside the ceremonies required by the scripture, some others are described by the rabbinical writers: on the vigil of the feast, the mistress of the family spread a table, and set on it two cakes of un-leavened bread, two pieces of the paschal lamb, one boiled, and the other roasted; to call to mind, it is said, that God had delivered them with an outstretched arm. The father of the family sat down with his family and slaves, took bitter herbs, ate them with mustard, and distributed them around; after which, all partook of the lamb, while he recited the history of the feast; and in conclusion, every one joined in hymns and prayers, The modern Jews, in general, observe the same rules.

Pastoral, in poetry, a name given to a species of eclogue, which, in the dramatic or narrative form, represents the manners and pursuits of shepherds, and the charms of pastoral life. In this species of writing, the images must be derived from rural objects, and the whole distinguished as well by simplicity as by elegance. A really beautiful pastoral can hardly be written by any other than a man who is at once possessed of an elegant mind, a stranger to school learning, and living in the sphere of life he describes: such an union of qualifications must be rare; yet it has existed in the present age; and in the writings of Burns are rural poems, answering to the pastoral, that surpass perhaps, any thing that the modern languages, at least, have to boast under this name.

Patent, *Letters*, are writings sealed with the great seal of England, by which a man is authorized to do or enjoy any thing which of himself he could not. They are also so called on account of their form being open, with their seal affixed, ready to be exhibited for the confirmation of the authority delegated by them. Letters patent for new inventions are obtained by petition to the crown: they have to go through many offices, and are liable to opposition on account of want of novelty, &c. and if obtained, and it can be proved that the invention was not new, or had been made public, previously to the granting the patent, they may be set aside. A patent that is to extend to the three branches of the kingdom, England, Ireland, and Scotland, will cost about 300*l*.

Patera, in architecture, an ornament frequently seen in the Doric frieze, and in the tympans of arches. The patera was a vessel used by the Romans in their sacrifices, in which they offered their consecrated meats to the gods, and with which they made libations; and hence, as the Doric was used for temples, it became an ornament of that order. It was also enclosed in urns with the ashes of the dead, after it had been used in the libations of wine and other liquors at the funeral.

Patriarch, a title at present appertaining to the supreme ecclesiastical head of several Christian sects or churches. The patriarch of Constantinople is the chief dignitary of the Greek church. The patriarch of Jerusalem, on a certain day in every year, solemnly excommunicates the pope.

Patrician, in Roman history, a title given at first to the descendants of the hundred, or according to some, two hundred senators whom Romulus created, and called *patres*, "fathers." It was afterward enjoyed by those who became senators by other channels than that of hereditary claim.

Patron, in the canon and common law, a person who having the advowson of a parsonage, vicarage, or other spiritual promotion, belonging to his manor, may present a clergyman to it whenever it becomes vacant. The right to present arises originally from the patron or his predecessors in the manor having been the founders or builders of the church; from their having given lands for its maintenance; or from the church having been built on their ground; and, frequently from all these causes united.

Pavilion, in architecture, a building contained under one roof, the resemblance of which to a tent is the origin of the name.

Pavo, the peacock, in natural history, is a genus of birds of the order Gallinæ. There are four species. The Pavo cristatus, or crested peacock, was originally brought from India in a wild state, and exhibited all its maturity of growth and glow of colouring. It was an article of importation from that country to Palestine, in the reign of Solomon, in those fleets which conveyed, once in three years, to the court of that magnificent monarch, the invaluable treasures of art and nature. In this country peacocks do not attain their full and brilliant plumage till their third year. They prefer elevated situations for roosting, choosing the tops of houses and the highest trees for this purpose. Buffon, in speaking of their plumage, says " it seems to combine all that delights the eye in the soft and delicate tints of the finest flowers, all that dazzles in the sparkling lustre of the gem, and all that astonishes in the grand display of the rainbow." See Plate Nat. Hist. Fig. 36.

Paying, among seamen; when the seams of a ship are laid over with a coat of hot pitch, it is called paying her.

[illegible]

[illegible]

[illegible] or [illegible] in a [illegible]

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Cooper ſculp.

Fig. 35. Macropus *the Kangaroo.*
Fig. 36. Pavo *cristatus: crested Peacock.*

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Peace of the king, that peace or security, both of life and goods, which the king promises to all his subjects, or others who are under his protection: such is the peace of the king's highways, which consists in the freedom from all annoyance and molestation; to which may be added the peace of the plough, whereby both the plough and plough-cattle are secured from distresses; and fairs are said to have their peace, which consists in the security of those who attend them from being arrested for debts contracted elsewhere.

Pearl, in natural history, a hard, white, shining body, usually of a globular, but sometimes of a pear-shape, found in a testaceous fish commonly called the pearl-oyster, and esteemed a gem of high value. The formation of the pearl is very satisfactorily accounted for by Reaumur. No one, who is in the least degree acquainted with the composition of animal bodies, is ignorant that their juices are capable of producing hard substances; and he justly observes, that it is far from extraordinary that a fish which has a sufficient quantity of stony juice to build, thicken, and extend a shell, should have enough to form these stones, if it happen to overflow, or burst into any cavity of the body, or among the membranes. This naturalist supports the common notion that the pearl is produced in consequence of a diseased state of the fish: but it is difficult to believe that whole species of animals are uniformly diseased; and we are bound by analogy to suppose that these excrescences answer some useful end.

The seas about the East-Indies and America yield pearl-fish in great abundance; and they are found with good pearls in several parts of Europe. In the east, the coasts of the island of Ceylon, and the Persian gulph, are the parts most celebrated for pearl fisheries; and in the west, the coast of Terra-firma, and the gulph of Mexico. The European pearls are chiefly found on the coast of Scotland, and in a river of Bavaria.

PEARL-*fishery in the East Indies*, an occupation which employs a considerable number of persons at two seasons of the year. The first is in March and April, and the second in August and September. Each bark puts off from the shore at sun-rise, with a land-breeze which never fails, and returns to the shore at noon, with a sea-breeze by which it is succeeded: when it arrives where the fish lie, and has cast anchor, the diver binds a stone, six inches thick, and about a foot long, under his body; which serves him as ballast, prevents his being carried away by the current, and enables him to walk more steadily under the water: he also ties another stone to one of his feet, by means of which he the more speedily sinks to the bottom of the sea: and, as the fish are usually firmly fastened to the rocks, he arms his hands with leathern mittens, to prevent their being wounded in pulling them off; but this part of the task some perform with iron rakes: lastly, each diver carries with him a large net, in the form of a sack, tied to his neck by a long cord, the other end of which is fastened to the side of the bark; the net to hold the fish he shall gather, and the cord to hoist him up, when he wants air, or his bag is filled. With this equipage, he frequently precipitates himself to the depth of sixty feet; and, when arrived at the bottom, immediately proceeds to load his net. However low beneath the surface of the water, the light enables him to see every thing with ease: by this advantage he is enabled, on some occasions, to resist large fishes of prey that approach him. Thus threatened, the first resource is to trouble the water, in order, by filling it with mud, to avoid the sight of the animal: yet they are not always able to escape the danger. The best divers will continue under water nearly half an hour; and the least expert not less than a quarter; and during this time, they hold their breath without the use of oiled sponges applied to their mouths, a contrivance adopted in the Mediterranean. When they wish to be drawn up, they pull the rope to which the bag is fastened, and those in the bark, taking the signal, heave them into the air, and relieve them of their burden. Some of the divers require a moment's respite, to recover their breath; others return immediately into the ocean, and continue their toil till noon, when, as has been said, the vessel makes for the shore.

To separate the pearls from the fish, pits, four or five feet square, are dug in the beach, into which the latter are thrown as they are brought from the rocks. Over them, heaps of sand, to the height of a man, are raised; and when the rain, wind, and sun, have obliged them to open their shells, by which means they are killed, the flesh rots, and the pearls, which are lodged in the head, the coat that covers it, the circular muscles that terminate it, the stomach, in a word, throughout the whole substance of the fish, are disengaged. After clearing the pits of the grosser matters, the sand is sifted several times, for pearls of different sizes, and every precaution taken to collect all that it contains.

PEAT, or Turf, is a congeries of vegetable matter, in which the remains of organization are more or less visible; consisting of trunks of trees, of leaves, fruits, stringy fibres, and the remains of aquatic mosses. It occurs in extensive beds, called peat-mosses, occupying the surface of the soil, or covered to the depth of a few feet, with sand, gravel, &c. In this country it is the common fuel of large districts of Wales and Scotland, and of some parts of England where coals are very dear.

PECORA OR PECUDES. See MAMMALIA and NATURAL HISTORY.

PECULIAR, in canon law, a parish or church that has jurisdiction within itself, and is competent to the granting probates of wills and letters of administration, exempt from the ordinary or bishop's courts. The king's chapel is a royal peculiar, the jurisdiction of which is in the king himself. There are also peculiars belonging to the see of Canterbury, and these are not liable to the visitation of the diocesan or suffragan bishops; and others that belong to deans, chapters, and prebendaries, and which are only exempted from the jurisdiction of the archdeacon: these latter are derived from the bishop, who may visit them, and to whom there lies an appeal.

PECULIARS, *Court of*, an ecclesiastical court, in which the affairs of peculiars are transacted.

END OF VOL. III.

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